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NOVEMBER 1970

# AMERICAN aircraft modeler

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## AEROBILE



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*Performance Tips*

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C**

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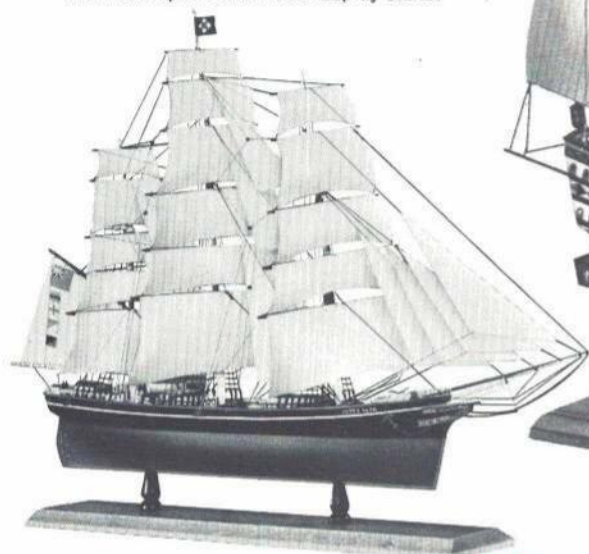
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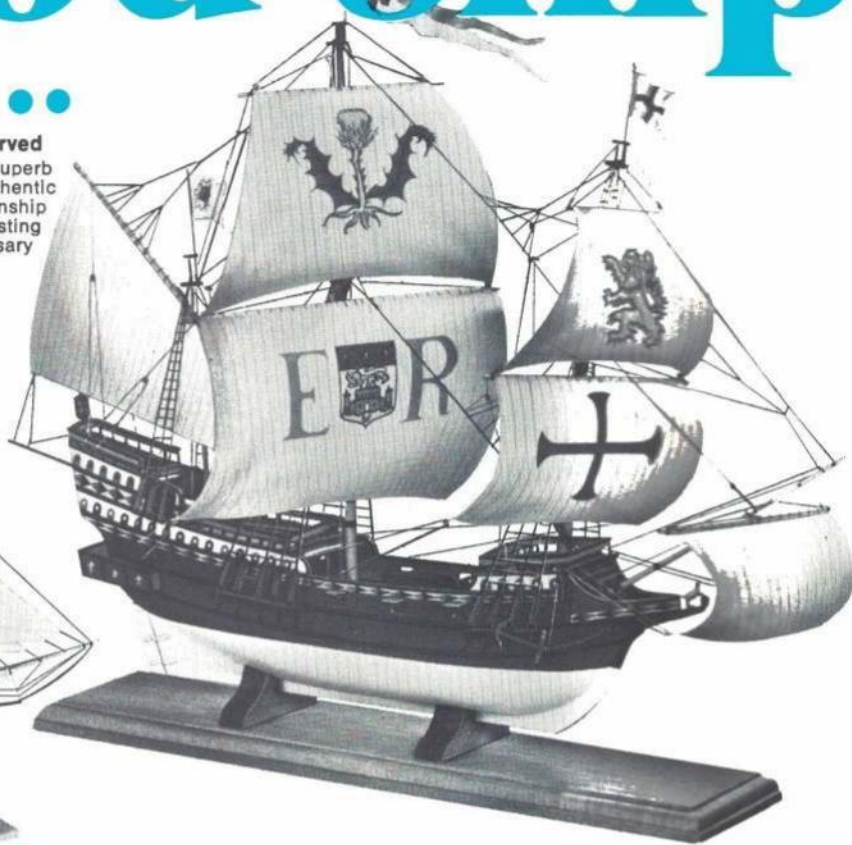
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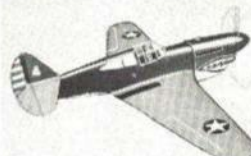
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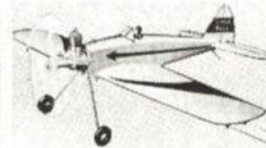
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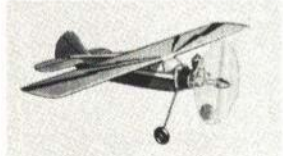
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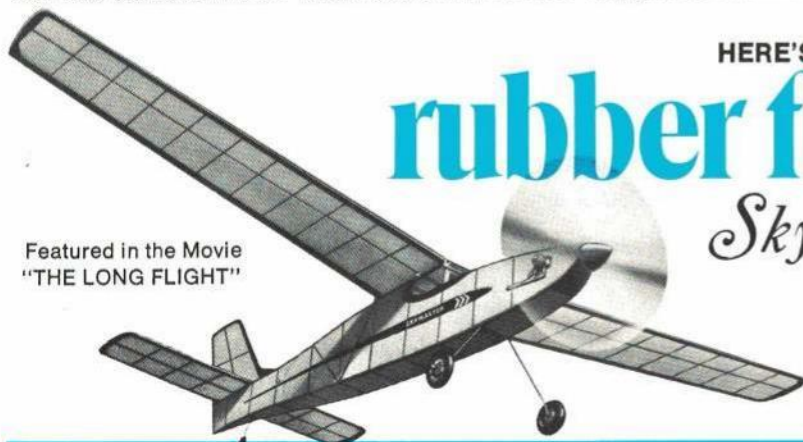
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COVER PHOTO: Miss Terri Green poses with Terry Aldrich's Waterman Aerobile at Santa Maria Airport. On real plane, entire swept flying wing could be removed when fuselage was driven as a car. Photo by Aldrich.

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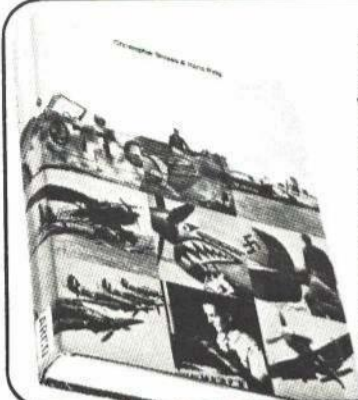
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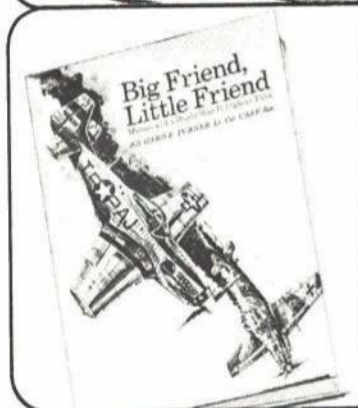


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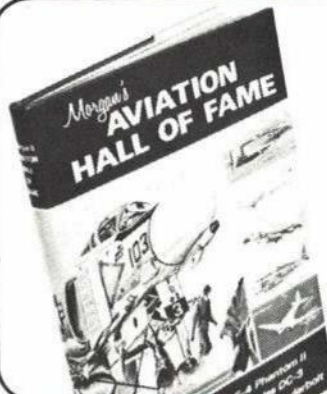
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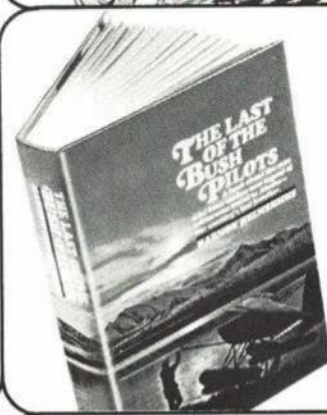
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## Straight...and Level



### There will be a 1971 Spokane Internats—and that's a story in itself

BOB KING, alias Robert F. King, Brigadier General Washington Air National Guard, Assistant Adjutant General, Air, is quite a guy. His letter of July 17, to "all concerned" with the Spokane Internats, that this two-year-old meet would be held again on July 10-11, 1971, proves it.

"On the basis of U.S. Weather Bureau climatological records, these dates should assure optimum conditions for a model airplane competition," he wrote us all. "Consideration is being given to making next year's Internats a three-day program instead of two. Many persons have suggested this."

Knowing King, S&L can't repress a benevolent chuckle. The events that occurred during the 1970 affair last June were wild. This is an ambitious undertaking, requiring the kind of coordinated logistics which only the Navy has approached (Navy's chores with the bigger, longer, heavily attended Nats are much tougher—though Navy can swing the manpower) and Plymouth flawlessly exhibited in the past at their own Internats in Detroit, which followed a nationwide elimination tied in with their dealers. The Washington ANG had this thing organized like clockwork.

The meet began on Saturday. Out at the field, where Voodoos—the real ones!—took off in pairs for their electronic war-games practice, there was a neatly organized trade show, in a spotless hangar. Bleachers lined the taxi strip. Governor Evans, whose boys are modelers, was due to address the crowd. Pylon jobs zipped back and forth in front of the stands—but the action was strangely subdued.

Way out on the field, the Pattern event crates performed occasional, lonely antics. In those vast open areas even a busy meet gets swallowed up. And it was overcast, chilly, and somewhat windy. We weaker souls took refuge in guest trailers, drowned ourselves in coffee, and talked shop. For New York this would have been a raw April day.

That night a banquet was scheduled at the Ridpath Motel for the Hall of Famers—Korda and Lewis couldn't get there, which made the writer a still colder specimen, what with a talk and gosh knows what else coming up. The banquet, incidentally, was a smash hit and, whereas the flying field looked half empty, the hall seemed crowded with all the modelers in the world. There was action in Spokane, that's for sure.

So on Saturday afternoon the governor, who was to fly in after a commencement address at a major University, was running late. The stands, of course, were empty. Would the meeting take place in the hangar? No. Where then? So a press conference was set up and, wouldn't you know it, the packed conference room, TV, radio and all, was taken over by hard-hitting reporters who bugged the patient governor about conservation, parks, and campus disturbances. It took nervy Jerry Kleinberg to give the governor a chance to talk about modeling and his boys.

On Sunday, as we jetted out to feed our own Monday morn press, a driving rain was sweeping all before it. Misery! Someone asked the modelers if they couldn't speed up results—not knowing what was involved in finishing some events. You know modelers? Many of

them vowed never again to leave sunny California. There followed a dejected notice by mail that in view of their excruciating pain (our words), there would be no Spokane Internats in the future. Bob didn't know his modelers. Take away a contest? Never!

So here's Bob delightedly telling us that: "It would seem that in its short life, the Spokane Internats has acquired a faithful and vocal 'alumni association' of sizeable proportions." And that: "Such loyal support is deserving of reciprocity of the Washington ANG." For the writer there's quite a story behind this.

It was on a nasty Saturday morning, three years ago, that we had written an editorial on the Navy's threat to drop the Nats because of lack of genuine youth participation. While AMA took care of that with a wow of a Delta Dart program held on the NAS involved, and all is now peace and light, Bob King happened into a library, noted a copy of AAM, and opened to that editorial. Knowing nothing about modeling he saw only the need to do something for air-youth. Letters, phone calls, and visits followed. He got after AMA, all the magazines.

The Camp Murray program was started, with kids to visit, receive instruction, fly models. A \$1,000,000-plus program was designed and pursued with school authorities and government in the far Northwest. Tremendous interest was generated—there would be facilities, tools, the works. A beautiful building, and King's personal magnetism and incredible dedication made the dream seem a shoo-in. Well he got part, not all, of what he wanted—but don't count him out. On top of all this, he dreamed up the Spokane Internats, to draw crucial attention to the real significance and size of the modeling movement, and all its social values to youth. It would be nice if you guys join this fight and, if possible, get to Spokane next July. It's part of a bigger thing. It should not be provincialized. Why not National Air Guard support for a program which includes kids—little ones and "big ones" both. More support is our constant bellyache.

Why this editorial? Well, it's about something a thousand times more important than that stupid inter-magazine spat over who really sponsored with what motel, you-know-which contest in the southwest. King is a man with a mission—one in a million. He produces. He keeps promises. Now Bob knows we favor his getting behind the kids, working with them in the Camp Murray concept, promoting Delta Dart things in the inner city—and we'd like that to catch fire nationally.

"Knowing how you feel about such things (as Bob knows, we don't flip over any man-only contest, not after all these years), I don't suppose the attached pronouncement will excite you," he writes, referring to the 1971 Spokane Internats. "You promised comments on this subject. Please don't forget."

Bob promised us something too at that Spokane banquet. That was never to give up his crusade. That's a hell of a lot to ask of any man. He won't. Go to Spokane. Get behind any youth-promotional thing in your own city, school, shopping center, hobby shop, or your own club, whether or not Spokane is out of the budget. Let's keep faith with this man.

*William Winter*



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### Barry Goldwater—modeler

Men from all walks of life have in the past and are still building Cleveland-designed models. You can imagine the thrill when I received a letter from an old modeler, Barry Goldwater, United States Senator from Arizona. Needless to say, I feel very honored to have him as a C-D fan for many years, even though unknown to me until the receipt of the following letter:

"First of all, I doubt that there are many people in this country who have made more kitted models than I have. I have flown over one hundred different types and am constantly finding old ones that have been out of manufacture for years.

"I am looking forward to the Great Lakes Trainer coming out again. In fact, I would like to have one sitting out at the field right now, as it has been a long time since I have felt wind on my face; that little airplane was the best.

"I am glad you have started the foundation. Things like that are long overdue in this field. In fact, I am trying my best to get the Smithsonian to start the Astronautical and Aeronautical museum going."

Ed Packard, Cleveland, Ohio

### Beyond the Delta Dart

Three cheers for the editorial in the July issue. You have clearly and succinctly presented what I believe to be our hobby's most serious problem today. As an old timer and an unabashed free flight enthusiast, I fear that we will lose a wonderful hobby if large numbers of today's young people are not given an opportunity to progress through easy steps of free flight flying.

The Delta Dart program is a wonderful start—but, as you so aptly questioned, where do they go from there?

Although there must be steps in between, I have taken some heart at the spreading interest in the so-called  $\frac{1}{4}$ A size powered models using the .020 engine. The relatively low cost, the more modest building space needed, the easier portability and the much smaller field requirement all seem to point to this size powered model as the direction to go to make such flying available to a larger segment of our younger population.

As with the Delta Dart, available kits and sponsored events will be needed in order for this to catch on. I am convinced that this size gas model should receive the full support of all those interested in saving free flight flying.

Stanley Johnson, Whittier, Calif.

### Ultimate status symbol

I got a real kick out of Hannan and Barrera's "Field Kit for a Free Flight-er." Free flighters are not the only ones who suffer feelings of inferiority and rejection at the field, though. Among RC'ers a similar status gap exists between those who thumb dual-axis levers on fancy boxes and those of us who (because of eccentricity or impoverishment, or both) still push a simple button on a simple-looking box.

Now that some propo manufacturers have a battery-test button on the faces of their transmitters, we single-channel nuts can indulge in a little status-enhancing deception of our own. The procedure is as follows: Put the guts of your simple tone transmitter in a larger, appropriately shaped, vinyl-covered box, with the on-off switch

in the middle and the tone-keying button in the upper right corner.

Then mount an RF meter, two control sticks, and a row of auxiliary channel levers in the customary locations. Naturally, everything on the face of the transmitter except the switch and the button is non-functional, except perhaps to your psyche.

Since purchasing two control sticks would put quite a hole in the budget, these can be simulated by simple aluminum rods that protrude through large square holes cut in the face of the transmitter. This carries the deception a step further by pegging you as a perfectionist who demands nothing less than the best in precision—provided by open-gimbal sticks!

Phil Milam, Atlanta, Ga.

### Infamous Q, pollution culprit?

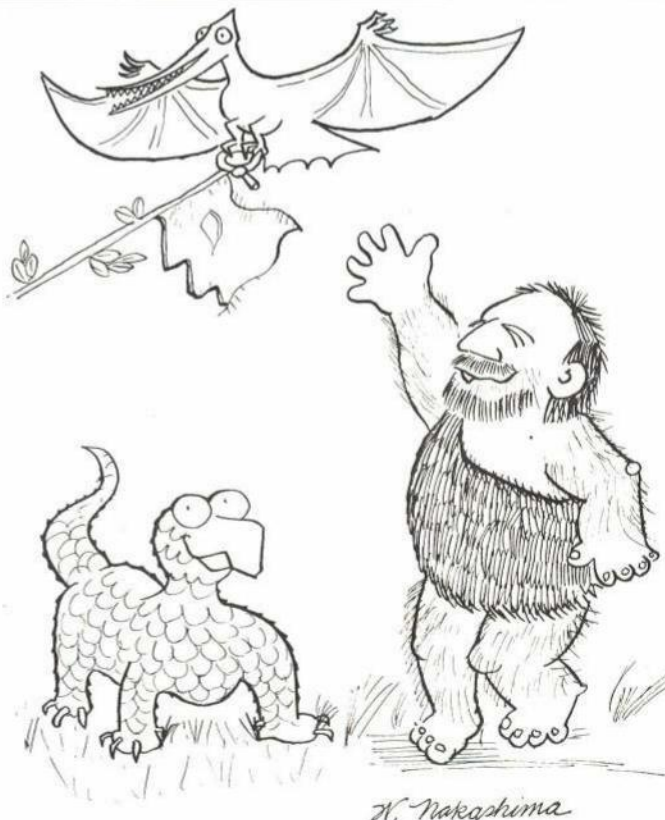
Reading "You Said It" on the GHQ engine and not bragging about the age limit on model builders, I have a tale of the GHQ...

In 1932, for some reason or other, I won the Manitoba Provincial Model Airplane contest and a trip to Toronto. Some fellows were there from Akron, Ohio that year to show us the gas jobs. They flew all right, glide angles about 1 to 5, but that gas engine—Brown Jrs. Oh, boy! They were hard to get but after a year a buddy and I saved the \$21.50. With the duty it came to \$39.37—I still remember trying to get it out of the Post Office.

In January of 1935 it was ready to go. My father was (and is) a great man—"Finish the plane and then start the engine." He just didn't know general headquarters.

Out to Stevenson's Aerodrome at 32 degrees below. I remember trying to start that old buzzard in the Old Winnipeg Flying Club hangar, with plenty of expert help. It didn't run.

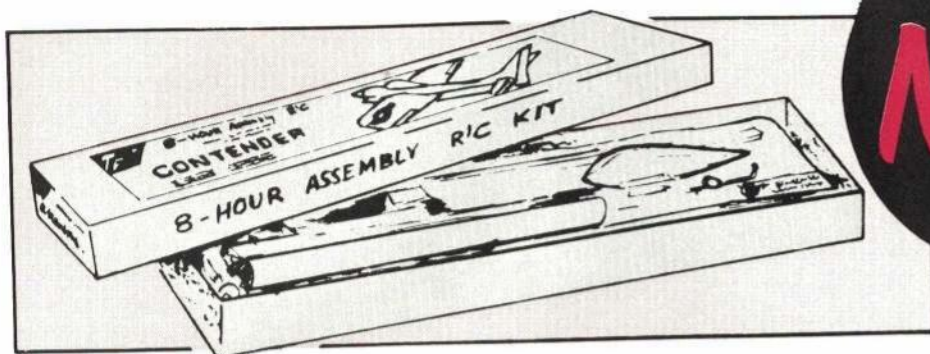
We took the engine out—set it up



H. Nakashima

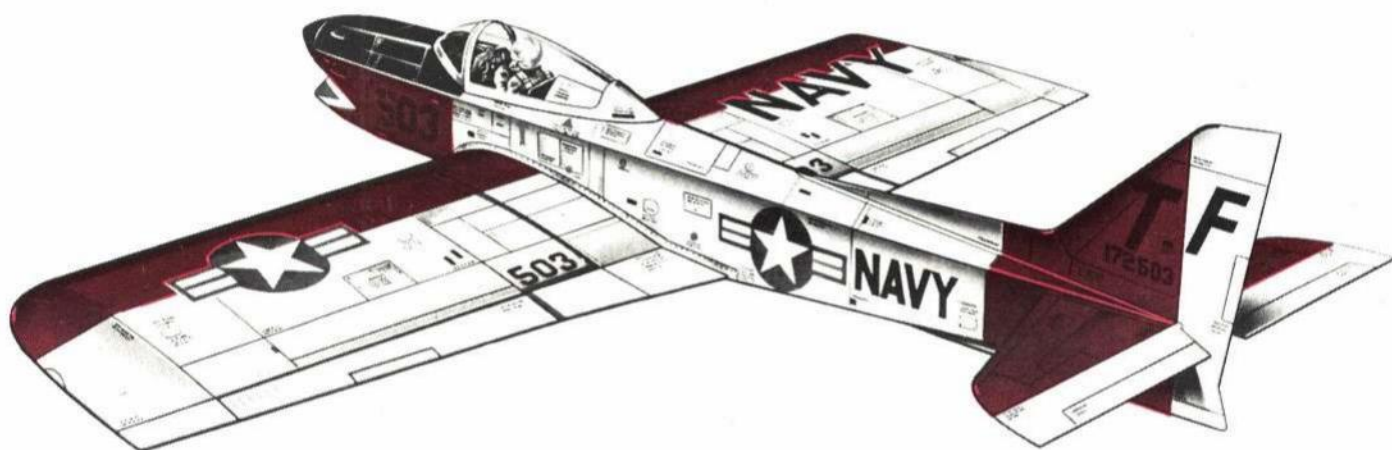


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Engine—.29-.60  
Kit #RC-15

**Price—\$34.95**



# GLUE or GLASS?



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Working time 4 minutes — Cures in 10 minutes New Formula 4 now comes in tubes as well as the double-pocket foil packets. Same formula, same exceptional strength. Easy to mix, it is non-critical when it comes to getting the right proportions of Part A and Part B. Don't worry if you don't get an exact 50/50 ratio — QUICK-FIX will cure, but never turn to brittle glass. Test it yourself. Mix a portion on a piece of paper and let it cure. Formula 4 will retain flexibility forever. Formula 4 QUICK-FIX Five double-pocket packets .....\$1.00 Two-tube set (2 ounces net wt.) .....\$2.00



### Formula 1 The Original Model Epoxy

Working time 15 minutes — Cures in 1 hour. Formula 1 is the original epoxy marketed just for model builders. For more than five years it has held more planes (and flyers) together than all other epoxies combined. Moderately fast-acting, it is ideal for building, adding strength to critical areas, filling nicks and dents. It will stick anything to anything. Formula 1 — The Original Model Epoxy Two-tube set .....\$1.00

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Working time 45 minutes — Cures in 3 hours. Formula 2 is a true epoxy designed for working on large surfaces. Ideal for use with styrofoam. Excellent for use as an "epoxy resin" for forming, filling or molding with fiberglass or our Easy-Does-It cloth. Formula 2 retains its strength, flexibility and impact resistance under all conditions. Formula 2 "Easy-Does-It" Glue, Two-tube set (8 full ounces). \$3.00

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in the vise, cast an aluminum prop and worked hard. One night I tried it again and actually got a pop out of it. It fell from the vise and took off all by itself, hitting all four walls of the basement and conked out. The sorry part is that after all the cranking all of us did on the Q, the only flight it ever made was by itself. It never ran again.

By March, I owned a new Brown Jr. and flew my Mayplane LR1 when it was only 10 below... successfully.

Oh yes. The GHQ was dropped from the Redwood Avenue Bridge into the Red River of the North. Possibly started all the water pollution that we hear about nowadays.

A. J. May, Bismarck, N. D.

*Perhaps we all have a common ancestry. Who didn't have a GHQ?*  
—the Publisher

### Cover girl?

I feel compelled to reply to "modeler's wife," whose letter appeared in the July issue concerning the "cover girl" and "half-clad woman" as featured on the March 1970 cover.

The "cover girl" mentioned must be all of 12 or 13 years of age (*Ed. note: She is 16*) and I'm sure any parent would be pleased to have as their daughter such a wholesome all-American appearing girl.

"Half-clad"? Modeler's wife hasn't been to the beach lately or stopped by her local junior high school to witness ladies attire.

As for encouraging our children to go into a hobby, how many model enthusiasts do you know who are drug addicts and criminals? Modelers are too busily involved with the hobby to become troublemakers. And what about disabled persons, people from broken homes and those with personal problems for whom modeling has provided a new direction in life, a wholesome interest to pursue.

Ed Okie, Cypress Gardens, Fla.

### Defender of free (dom) flight

I just finished reading "Field Kit for the Free Flighter" (Aug. AAM): Hannan and Barrera had no right to knock FF for it is an art. We free flighters are the cream of the crop in this hobby! We are the ones that have to trim our planes each flight until they fly right—or else they won't fly at all.

The article mentioned that a free flighter goes to the field with a feeling of inferiority and rejection. Somebody's nuts! FF has a higher standing in my book than RC and CL—and we need no status at all.

We don't fly RTF or ARTF. We have to build and fly, not take a plane out of a box and fly it, which makes FF all the more special.

Michael Valdrow, Milwaukie, Oregon

*We doubt that either Bill or Russ look down their noses at free flight, both being generally interested modelers—and Bill builds practically nothing but FF anyway, even if it is the zany or fun-type stuff. Tongue-in-cheek stuff can backfire when it concerns the other guy's bit. Do agree, Mike, that FF needs no defense. It's proud stuff.*

—the Publisher



# Guillow's World War 2

## 3/4" scale flying models

### FABULOUS SCALE DESIGN

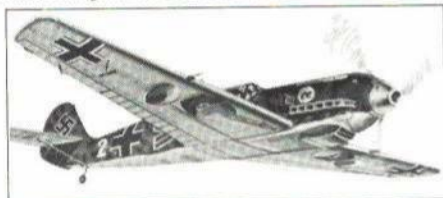
The ultimate in realism for the super-detail bug — exceptional flyers for those who build to fly. Can be flown rubber powered, U-Control, gas free flight or simple R/C. Superior quality — unusual values!



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KIT 1002 JUNKERS JU87-B STUKA • 34" \$10.00  
Feared German dive bomber.



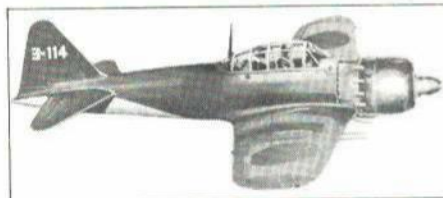
KIT 401 MESSERSCHMITT BF109 • 24 3/8" \$6.00  
German fighter used all thru WW-2.



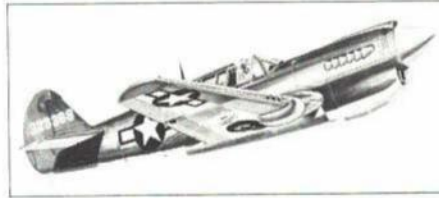
KIT 402 N. AMERICAN P-51 MUSTANG • 27 3/4" \$6.00  
U.S.A.F. fighter. Protected bombers.



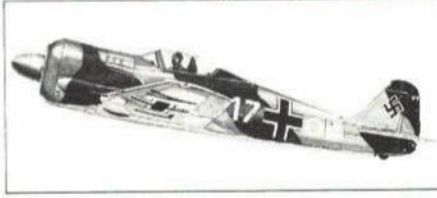
KIT 403 SUPERMARINE SPITFIRE • 27 3/8" \$6.00  
Defeated Luftwaffe in Battle of Britain.



KIT 404 MITSUBISHI ZERO • 27 3/8" \$6.00  
Led attack on Pearl Harbor, Dec. 7, 1941.



KIT 405 CURTISS P-40 WARHAWK • 28" \$6.00  
"Flying Tiger" of China-Burma — WW2.



KIT 406 FOCKE-WULF FW-190 • 25 3/4" \$6.00  
German radial engine fighter.



KIT 204 FOKKER TRIPLANE • 20" \$4.00  
Made famous by Germany's Red Baron. WW1.

## World War I

### scale flying models



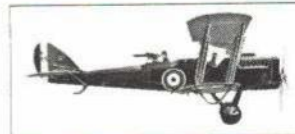
KIT 202 BRITISH SE5A • 24" \$4.00  
Fighter flown by Bishop and Mannock.



KIT 203 NIEUPORT 11 • 24" \$4.00  
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# Wright Brothers Memorial RC Championships

An interesting visit to one of the biggest annual RC meets.

**DON LOWE**

Photos by Chuck Shade



Thirteen scale models were entered. Note variety in age and type categories.

THE EIGHTH ANNUAL WRIGHT Brothers Memorial RC Championships were held in excellent Air Force facilities, but the weather ranged from perfection on Saturday to high winds and spotty showers on Sunday. Sponsored by the Western Ohio Radio Kontrol Society, this meet drew 98 contestants from around the country. Its ten scheduled events included Class A Jr./Sr.; Class A Open; Class B; Class D N & E; Scale; Formula I; FAI Pylon; and a special event, Bi-plane Pattern.

Competition in the pattern events was pretty evenly divided. Pattern was flown using six-minute short patterns on Saturday, with four flights per contestant. Four flight lines were set up, using the NATS arrangement of two lines on each of two complexes. At each complex, a numerical display system, visible from all over the area, indicated the next flier up and kept fliers constantly informed of their flight positions. This assured

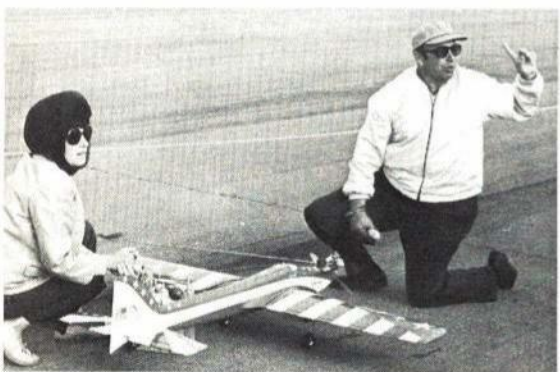
*(Continued on page 63)*



Jerry Worth shows off his low mid-wing "Rampage." A very pretty original design.



A Phoenix flown by Al Dupler to 4th in D Expert. Mufflers used by almost everyone.



Above left: Ed Izzo emphasizes a point! He had tough luck with collapsing retracts and with rain during flyoff.

Above right: Ken Drummond's B-36 uses 35's, weighs 19 lb., operates flaps, drops bomb in flight, and flies extremely well.

Left: Don Lowe and son inspect Formula I racer. Racing is now such a popular event that separate meets are needed.

Right: Ed Keck, winner in Class D, flies KDH-retract-geared original "Starfire." A groovy and graceful plane with colorful and purposeful paint job. Strip ailerons are becoming popular again.







# CARL GOLDBERG

## New! RANGER 42

The Versatile *Almost-Ready-To-Fly* Fun Model

For Single or Multi-Channel  
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Weight 26-36 oz.

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2. Single Channel Radio, Galloping Ghost
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4. Three Channels, Rudder, Elevator, Engine Throttle
5. Four Channels, Rudder, Elevator, Engine Throttle, and Ailerons
6. Free Flight

Full explanation of each method given on plan.

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- Instructions on Operating Radio Control Models

For .049 to .10 Engines

Only **\$17<sup>95</sup>** PRC1

Radio Control Flying is Fun! You can actually feel the thrill of controlling an airplane in flight — doing stunts, loops and rolls — and making it come back to you and land where you want. And the shortest way to success is with the unique new RANGER 42. This model has been carefully engineered, leaving only the simplest final assembly steps, all clearly illustrated. Flight stability is exceptional, as well as response to control. All you have to do is add your engine, wheels, and radio control — only 6 to 8 hours work — and you're ready to go FLYING! Just ask your hobby dealer — he'll be glad to show you the features.

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Great Flying Model!

DELUXE — Includes New Fittings

### 1/2 A SKYLANE \$9<sup>95</sup>

For Single Channel —  
Escapement, Servo or Pulse  
Span 42" Area 244 sq. in.  
Length 35" Weight 22 oz.  
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Tough, roomy cabin and front end, takes single  
to 10 channels or proportional.  
Steerable nose gear.

SPAN 62" AREA 540 sq. in.  
LENGTH 50" WEIGHT 4 1/2 - 5 lbs.

FOR ENGINES FROM .19 to .35

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The Design That  
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Simplest, Sound,  
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DELUXE — Includes New Fittings.  
Takes Single to 10 Channels or  
Proportional

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Span 56" Area 558 sq. in.  
Length 43" Weight 3 1/2 lbs.  
For .09-.15-.19 Engines

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For Single Channel —

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Span 37" Area 250 sq. in.  
Length 28" Weight 16 oz.  
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World's FIRST  
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Twin Engine  
R/C Models

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### SKYLARK 56 \$21<sup>50</sup>

Takes Single to 10 Channels  
or Proportional  
Span 56" Area 528 sq. in.  
Length 44" Weight 3 1/2 - 4 1/2 lbs.  
For Single Eng. .09, .15, or .19  
For Twin Eng. Use Two .09's or .15's

### JR. SKYLARK \$7<sup>95</sup>

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Span 37" Area 235 sq. in.  
Length 29" Weight 18 oz.  
For Single Engine Use .049  
For Twin Eng. Use Two .01's or .02's

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Enough Wing Area and  
Stability so YOU  
Can Fly It!

**\$27<sup>50</sup>**

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# Tips for Performance

Exploring rubber-power flying models the direct way, using a 49¢ ready-to-fly balsa job.

**BILL HANNAN**

ALTHOUGH RUBBER IS one of the oldest forms of model aircraft power, it remains one of the least understood. By employing a simple "flying laboratory" approach, much of the mystery can be eliminated. If deep theory and equations are your bag, look elsewhere! Here we shall try to prove that learning can be fun.

The first requirement is a simple, dependable aircraft. Several brands of ready-to-fly models are on the market, but a North Pacific Sleek Streek was chosen because it is widely available in

ing; (2) After being correctly aligned, the fin and stabilizer are glued into their slots. These changes are not intended to hop up the model, but are merely to make it more rugged and able to withstand the rigors of hard testing.

## Equipment and Materials

In addition to the model itself, the following items will prove useful: stopwatch, mechanical winder, needle-nose pliers, wire cutters, 1/32" diameter music wire and sandpaper. Also needed are tape, glue, different sizes and types of rubber, different sizes and types of props, rubber lube, oil and thrust washers. It is not absolutely necessary to have all of the above items, but the more that are available, the more extensive can be the experiments. Briefly, the purpose of each item is as follows:

**Stopwatch:** To determine how changes affect a model's performance, a means of comparison is needed. Judging slight improvements by eye is difficult and at best inaccurate. Measuring the actual time in the air from launch until touchdown is a much better system. If a stopwatch is not available, a regular watch with a sweep second hand will do.

**Winder:** This is a basic tool for rubber-powered model flying, since winding by hand is a slow, tiresome task. Some modelers prefer to wind by hand and can offer good reasons for doing so, but they are in the minority. Winders can be purchased commercially, or they may be converted from hand drills, by attaching a suitable winding hook. If you construct your own, make certain that the hook is securely attached, so that it will not work loose under a strong pull. Winders differ in ratio; that is, for each turn of the hand crank, the hook will revolve a given number of times. The hand drill conversions usually have about a 4 to 1 ratio, while the small commercially-made units have a 16 to 1 ratio.

**Needle-Nose Pliers, Wire Cutters:** These tools are used to fashion propeller hooks, for use when propellers are changed.

**Music Wire:** One length will provide enough material for many prop hooks.

**Sandpaper:** Use to reduce the weight of the heavy blade, if a prop is found to be out of balance. It also may be used to smooth and lighten the entire model, if desired.

**Tape:** Use to reinforce the wings and for emergency repairs.

**Glue:** Use for assembly and repair purposes.

**Rubber:** Several sizes and types of rubber strand are manufactured. Try at

least a small quantity of every available size. If the local hobby store does not stock different types, try a mail-order source. For longest lift, rubber should be stored in an air- and light-tight container.

**Propellers:** The ready-to-fly model comes equipped with a prop, but, in addition, obtain one or more different types. For example, the North Pacific Skeeter, a smaller model than the Sleek Streek, features a scaled-down version of the same prop design, and the plastic nose piece can be directly interchanged with the larger one. Other brands of plastic or wooden props in the four- to six-in. diameter range should be obtained, if possible, for test purposes. Some props left over from small kits also would be suitable. The more types on hand, the more prop/rubber combinations can be tried.

**Rubber Lube:** A real must for rubber-powered models, rubber lube will allow any given motor to accept more turns and will extend its life. Commercially-prepared lubes are available at low cost, or castor oil may be used. Do not use common motor oils, which will attack rubber.

**Oil:** While motor oil cannot be used to lube rubber, do use it or sewing machine oil on the prop shaft bearing. A single drop is enough, since an excessive amount is apt to work its way down the shaft and onto the rubber.

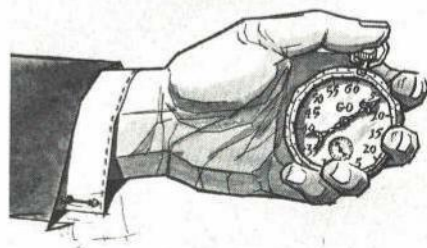
**Thrust Bearings:** Some ready-to-fly models do not feature thrust bearings. After a time, the plastic prop hubs wear down and friction increases. To prevent this (or remedy it) tiny washers or sequins are placed between the prop and prop shaft bearing. Some experts instead use Teflon washers, which do not require lubrication.

**Notebook and Pencil or Pen:** Any

Any model's performance can be improved systematically. Tests and experience are best gained with ready-to-fly types.

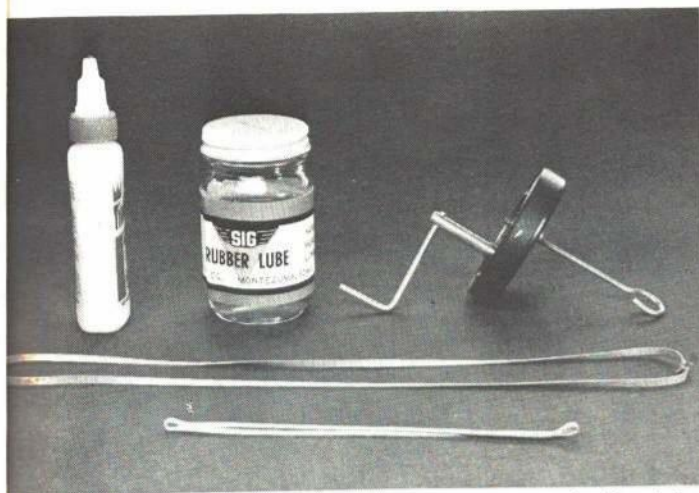
hobby shops, supermarkets, and some drug stores. If this brand cannot be found, another may be used. Other slightly more complex aircraft, such as Delta Darts, are suitable also.

The Sleek Streek is assembled according to package directions, with the following exceptions: (1) Two pieces of masking or clear tape are applied across the wing center section. This prevents the wing panels from popping out of the wing mount in case of a hard land-

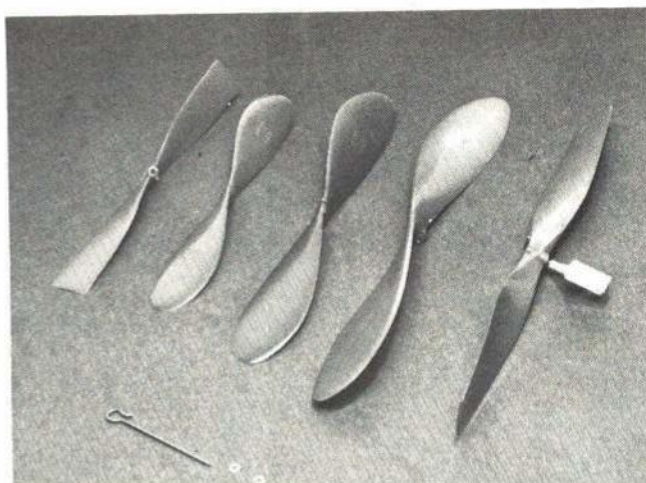


Most important testing tool is the stopwatch. Checking relative performance is the goal.





Glue to attach flying surfaces permanently, commercial rubber lube, a commercial winder (or alter a hand drill), and a selection of rubber of different sizes are needed.



Changing props will significantly affect a model's performance. Smaller prop and motor might fly the plane longer than a big prop and strong motor. Some effects are surprising!

small notebook or tablet will serve to record test results for future reference. The simple form we used is illustrated, but you may wish to design your own.

Last, but not least, find a willing assistant to help with the experiments. If it can be another modeler, both will benefit greatly and perhaps they can share the supplies.

#### Testing Procedure

All tests should be performed under calm conditions, since wind can adversely affect flight performance and cause inconsistent results. Early mornings and late afternoons generally are the quietest times.

First flights should be performed according to the manufacturer's instructions, hand wound, and with the standard prop and rudder. Primarily, this is to be certain that the balance is correct. If necessary, shift the wing along the fuselage or, in the case of a model which does not have a movable wing, add clay ballast at either the nose or tail, as required. Check also for warps. Sometimes during shipment a panel will become twisted or bent. By breathing heavily on the affected part and bending it a little beyond the desired position, a warp can usually be corrected. Be aware, however, that it may return, especially if the temperature changes.

Once satisfied that the model is flying reasonably well, try timing a few flights. Our initial timed flights were performed using the manufacturer's recommended 170 turns, hand wound. Bear in mind that individual models will vary

in performance ability, depending upon the weight of the balsa from which it was made, length of time the model has been on the dealer's shelf (which can affect rubber condition), etc. Caution: beware of false readings. A poor launch can handicap the model's true potential and, conversely, a thermal can boost duration. Neither presents a true picture of what the model is likely to do under average conditions. The number of flights per test is a matter of choice, but at least three or four are suggested.

If the model is equipped with a propeller free-wheeling device, as are Slick Streaks and Delta Darts, conduct an instructive test by timing the model with the free-wheeler locked up, by means of tape or string. Note the effect on the glide.

Next apply some rubber lube to the stock rubber band, and note how it alters the feel even while hand winding.

#### Winding

When using a mechanical winder, models are usually wound from the front. However, with simple stick models, we prefer to wind from the rear, since it is easier to remove and attach the rubber loop to the rear fuselage hook. The procedure is as follows: have a helper grasp the prop firmly, while you stretch the rubber loop to about three or four times its normal length with the winder. While cranking in the turns, walk slowly toward the model until a point near the rear hook location is reached. The safe number of turns will have to be learned by experience, and a few strands of rub-

ber will be broken while a feel for it is developed. Charts which list the safe number of turns that can be used for different sizes of rubber have been published. The mathematically inclined may study one or more of the charts, but none is a substitute for experience. Rubber is inexpensive when compared to glow fuel or rocket motors, so don't be afraid to sacrifice a few strands in the interest of education!

It should be understood that individual batches of rubber differ in quality, regardless of brand, and results can be expected to vary. The big advantage of testing rubber on simple models is that a blown motor is unlikely to do much damage. By contrast, a fractured band in a scale job is almost bound to extract a few bits of structure and tissue in the process!

Another important point to remember: count the number of turns as they are put in, so that results can be duplicated. Usually only the turns of the winder's crank are counted, so don't bother computing how many actual turns are being put in. It is merely a matter of multiplication to find the actual number of turns for scientific comparison. Warning: a prime rule in rubber power model circles is never talk to a man while he is winding!

Any reference to breaking in rubber motors has been purposely omitted. It is another subject of conjecture and controversy. Suffice it to say that the properties of a motor change somewhat after it has been wound several times. This too becomes evident as you go along. After a stock motor or two has been used up, make new ones from rubber strand. With any given size of rubber, the power can be varied by altering the length of the loop. A short loop produces greater power, but it cannot hold as many turns as a longer loop. The knot should be securely tied before applying rubber lube, since it is difficult to tie a knot in slippery rubber.

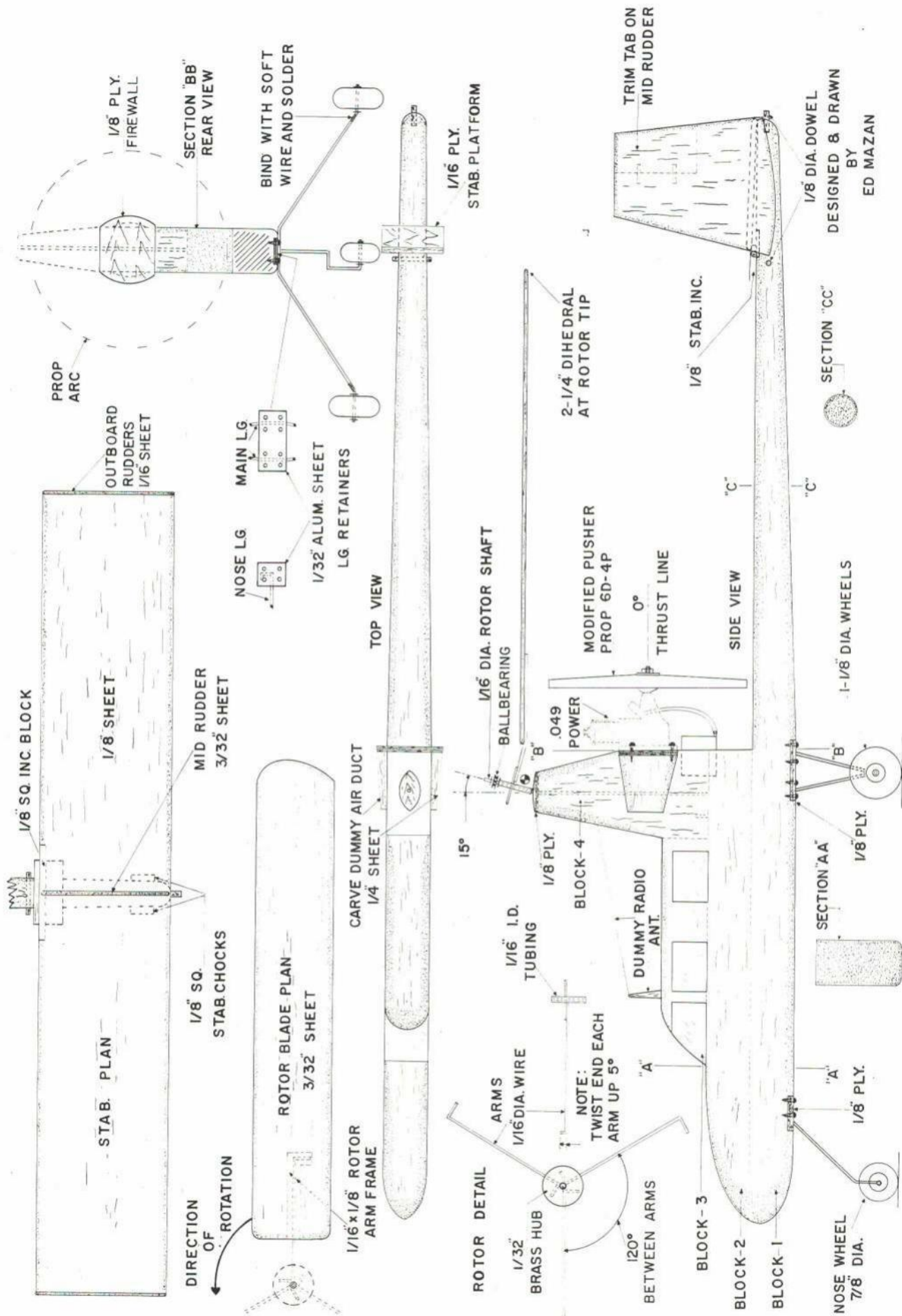
Note that when changing rubber or loop sizes, the balance of the model may be affected, and suitable adjustments will be required. Also, greater amounts of power will usually alter much more than just the models' duration. A model, which is docile with low power, may turn into an unmanageable beast when more "zap" is applied. Thus ample practice in adjusting the model's flight sur-

DATE: OCT. 4, 1969	CONDITIONS: CALM	FLIGHT NUMBER			
MODEL: NORTH PACIFIC "SLEEK STREEK"		1	2	3	4
COMMENTS: STOCK PROP, STOCK RUBBER HAND WOUND, 170 TURNS		(TIME IN SECONDS)			
		8.5	7.0	9.0	9.5
STOCK RUBBER, 240 TURNS, WINDER WOUND		12	11.5	N.G. (CRASH)	12.5
" " 320 TURNS " "		15	14.5	15.2	15.5
" " MOTOR FAILED AT 336 TURNS					
TESTS CONCLUDED BECAUSE OF DARKNESS.					

TYPICAL PERFORMANCE CHART

(Continued on page 74)

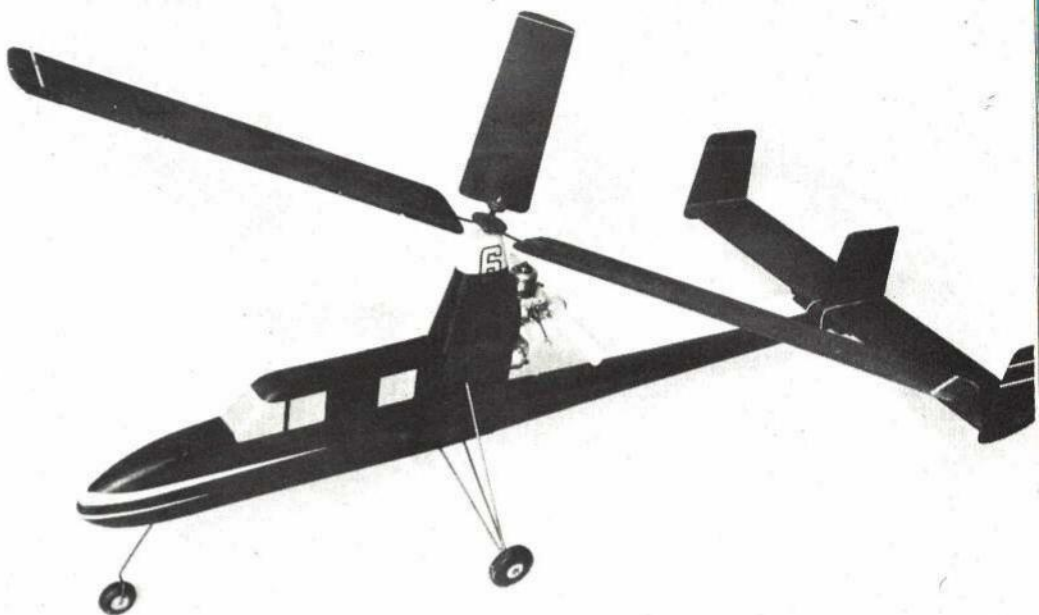








As author illustrates, one must hold the model into the wind to get rotor up to speed. It does not take off from the ground.



This spin-wing plane is patterned after the Umbaugh autogiro. Note the use of three rudders for adequate stability and to balance the cabin area. As long as the rotor is spinning the plane is safe, low altitude stalls and engine failures are not disastrous.

# AUTOGIRO

This wing slinger is a humdinger. Climb is fantastic and glide is all non-thermaling.

ED MAZAN

THE AUTOGIRO WAS invented by Juan de la Cierva of Spain. Although Cierva designed numerous successful conventional aircraft, he constantly searched for means to make air travel safer. In the early days of aviation, pilot error was the most common killer, since fixed wing aircraft often stalled and crashed. Cierva finally envisioned an aircraft with a freely rotating wing which could be completely independent of speed. In 1923 the autogiro was born.

Using a conventional aircraft, Cierva replaced the fixed wings with a free-spinning rotor, mounted off the fuselage on a tripod pylon. The autogiro proved its safety characteristics. No stalls or spins marred its performance. Most important was its ability, upon engine failure, to descend almost vertically at a rate roughly comparable to that of a parachutist.

The autogiro is not a helicopter. Their only likeness is the rotor, and their flight characteristics differ greatly. Autogiro lift is accomplished by a free-floating rotating rotor not connected to engine, while forward thrust is derived from a conventional motor and propeller.

Our model autogiro is a semi-scale design based on the recent full-scale Umbaugh autogiro. The ship is made of light or medium-weight solid balsa. It

requires a large fuel tank because, in still evening air, the autogiro is capable of reaching fantastic altitudes nearly overhead, yet descending only yards from the point of launching.

## Construction

**Fuselage:** The fuselage is carved from a unit of four separate solid balsa blocks, glued together. From 1" sq. light weight balsa, cut to proper length Blocks 1, 2, and 3, as indicated on plans. Arrange the blocks in proper order, glue and allow a reasonable time for drying. Cut Block 4 to length from medium weight balsa, 1x2" in cross section. Using the X method, find the center of each block's end. Through these bottom ends, insert 1/16" dia. wire rotor shafts (see plans).

After inserting and firmly gluing the shaft in Block 4, cut an oval pylon cap from 1/8" plywood. Drill a 1/16" dia. hole through the cap and glue it to the top pylon Block 4. Now glue assembled Block 4 to the previously glued unit of Blocks 1, 2, and 3.

Allow the glued unit to set overnight, then bend the rotor shaft back 15 degrees from a vertical position. Use the joint line between Blocks 1 and 2 as the horizontal base line for measuring the angle with a paper template.

In the fuselage bottom, hollow out wells for 1/8" plywood landing gear plat-

forms. Glue the well areas and insert plywood for nose and main landing gears. Cut the engine firewall from 1/8" plywood and glue into position, aligning carefully. The engine must be mounted with the thrust line at zero degrees. Add dummy air ducts, carved from 1/4" sheet balsa, to each side of the pylon. Now the fuselage can be carved and sanded to shape and cross section. Glue the 1/16" plywood stab platform to the fuselage and check alignment. This platform, along with the stab chocks, will key the entire tail assembly.

**Stabilizer and Rudders:** Cut the stab from 1/8" sheet and sand leading and trailing edges round. All edges of all flying surfaces must be sanded round, since no special airfoil sections are used. Outboard rudders are cut from 1/16" sheet and the edges sanded. The mid-rudder is cut from 3/32" sheet. After it has been shaped, cut trim-tab and insert two soft aluminum hinges as shown. Trim-tab is located only on midrudder. Glue rudder and stab assembly, checking alignment. Attach 1/8" sq. balsa chocks to bottom of stab with glue. A 1/8" sq. balsa incidence block is added at the bottom of the stab, near the landing edge.

**Rotor Hub and Arm Assembly:** Cut  
(Continued on page 73)







## Plane on the Cover



K&B 45 with reverse pitch 11-inch prop pushes the 7½-pound model through the air at realistic and safe speed. Electric motors power real wheels on the ground.

# Aerobile

The flying wing roadable aircraft of 1937 makes a unique CL or RC model with removable wings and drivable "car."

**ROBERT ANGEL**

The elevators also are operated differently for aileron control in real plane or in an RC model. Rudders move only outward. Wing and prop removed for road travel.

A COLORFUL PAGE in aviation history is occupied by the Waterman Aerobile, or "flying automobile." Many of flying's pioneers dreamed of an airplane that could drive through the streets like an automobile or soar cross-country on its wings. Two men, Molt Taylor and his Aerocar and Waldo Waterman with his Aerobile, came close to making that dream a commercial success. A limited production of the Aerocar was undertaken during the 1950's.

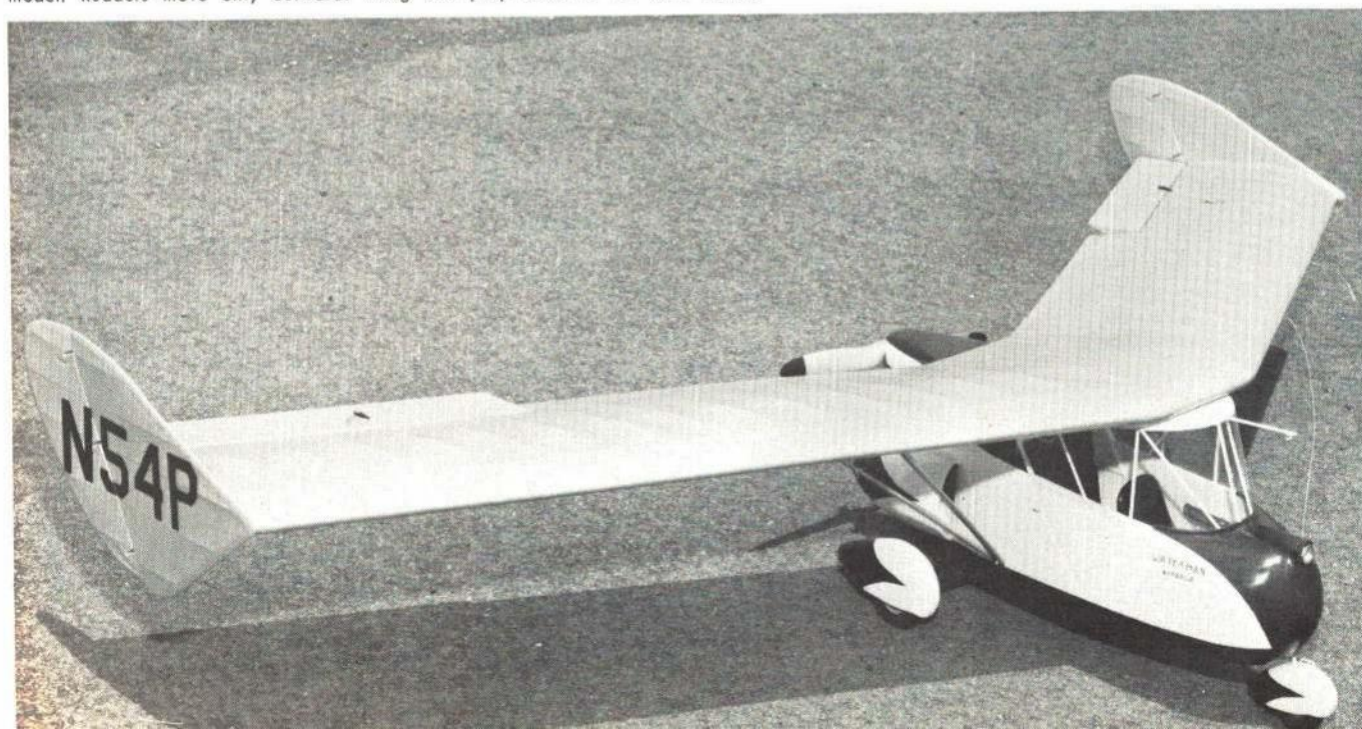
Mr. Waterman, a capable aircraft designer, worked actively for over 20 years on his craft, flying a total of six. The final version, first flown in 1957, is modeled here.

The full-scale Aerobile carried three passengers. It had a one-piece 38-ft. detachable wing. Power was a Tucker automobile engine, driving the propeller, or the wheels if on the ground. Top airspeed was 120 mph, landing speed 45 mph. As an automobile, it had a top ground speed of 70 mph and was licensed for highway operation in California.

The model is a little larger than 1/7 scale, having a 67-in. wingspan. It weighs 7½ lb. and is powered by a K&B 45 RC engine, turning in an 11-in. dia. pusher prop. The J. Roberts three-line control system provides engine throttle control. A battery-powered electric motor drives the wheels to demonstrate its automotive characteristics. The working headlight is controlled by a switch on the instrument panel.

The model is quite stable, although a little less weight or more power could be used. One unusual flying characteristic, caused by the line leadout location, should be mentioned. To avoid spoiling the scale effect by having leadout supports below the wing or by locating a bellcrank inside the cabin, the wires exit directly from the wing leading edge, well above the center of gravity. This causes the model to fly with a noticeable bank into the turn, which adds to the scale effect in slow level flight, but decidedly unnerves old control-line pilots.

How Terry Aldrich came to model the Aerobile is a story in itself. His job as a





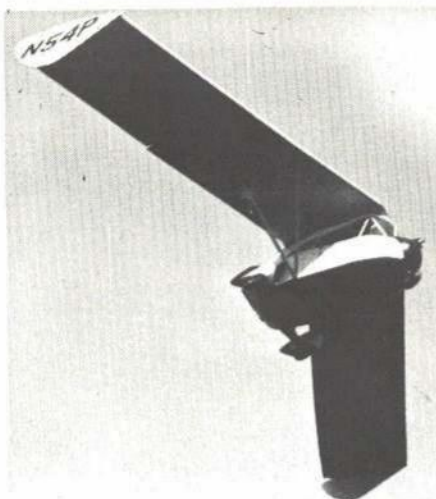




board." Axles are  $\frac{1}{8}$ " piano wire running inside full length tubing. The wheel pants, with axles epoxied into place, are the only means used for wheel retention. The short tubing between wheel pant and fuselage on the nose wheel must not be attached to the fuselage and should have  $\frac{3}{32}$ " clearance to allow some movement. The axle brace is  $\frac{5}{32}$ " brass tubing soldered to the brass axle housing and epoxied to the fuselage.

The Aerobile's cockpit is rather Spartan. All instrument panels and the steering wheel are flat black. The front seat is a single semi-bucket type, while the rear seat is a bench type, seating two persons. These can be made of balsa. Note that there is a door on the right side only, and the rear cabin strut on that side is slanted instead of vertical.

The motor mounts are spaced for the K&B 45 RC. Spacing (width) for the builder's engine should be verified and altered if necessary. The airscoop of carved balsa is a working one and allows some air circulation through F-6 and around the engine. The engine on



Aerobile is an odd one in flight, yet easy to fly; however, the short wheelbase requires a smooth landing. Prop in back won't break.

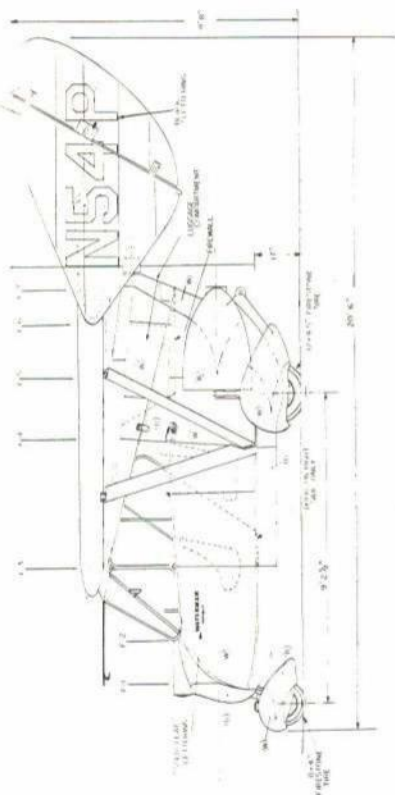
the model was exposed, although the plans show the scale outline in the event the builder wants to install a screen around the engine. The carved balsa scale prop is replaced for flying by a regular 10-6 pusher prop. Concealed rubber bands hold the removable engine top block in place, although screws into the motor mounts would work nicely.

Wing construction is fairly straightforward. The three-piece sandwich construction of the tip rudders was found necessary to eliminate warpage with the silk covering. The wing elevons are rigged to work up and down together as elevators only, for control-line flying. The control movement is transmitted to the elevons by torque, or rotational movement of the torque rod. The three torque-control horns should be made of steel and silver-soldered to the torque rod. It will be necessary to splice the torque rod for sufficient length by sweat-soldering two ends into a common piece of  $\frac{3}{32}$ " ID brass tubing. A small bellcrank can be cut down to make the transfer bellcrank shown on the plans.

Due to the wing sweepback, the elevator pushrods operate with a slight sideways movement as well as fore and aft. Be sure to provide sufficient clearance for this movement in the pushrod exit plate on the outer wings. Plywood ribs are used for all outer ribs to prevent warpage by the silk covering. This includes the outside elevon ribs and the wing ribs adjacent to the elevons. The wings should be covered with silk before cementing the rudder assemblies into place.

As with any scale model, the final degree of finish and detail depends on the individual. This is where the winners stand out from the other nice-looking airplanes. It's up to the builder to figure out what materials to use and how to make the rear view mirror.

Last version of real plane resides with the Smithsonian Air Museum in Washington, D.C. It was licensed as motorcycle for road use!



CONSTRUCTION AND PERFORMANCE

WING: ATTACHED AND SPARS WITH ALUMINUM NUMBER 1 ALUMINUM LEADING AND TRAILING EDGES, 20% TAPERED EXCEPT LEADING EDGE FORWARD OF FRONT SPAR, UNCOVERED NATURAL ALUMINUM

FIN AND RIBS: METAL PLANE, FABRIC COVERED

BALANCE OF AIRCRAFT: CHROME MOLYBDENUM TUBING ALUMINUM COVERED

WING AREA (SOL ELEVONS)	284.0 SQ. FT.
WING LOADING	10.8 LBS./SQ. FT.
POWER LOADING	15.8 H.P./SQ. FT.
TOP SPEED	100 M.P.H.
CRUISING SPEED	75 M.P.H.
LANDING SPEED	45 M.P.H.
WEIGHT EMPTY	150 LBS.
USEFUL LOAD	250 LBS.
GROSS WEIGHT	400 LBS.
FUEL CAPACITY	25 GALS.
OIL CAPACITY	5 GALS.
POWER - TUCKER LIQUID COOLED AUTOMOBILE ENGINE	
SURFACE SPEED (AS AUTOMOBILE) MAX.	100 M.P.H.

CHECKED: *Paul R. Matt* DATE: *June 1964*

DRAWN BY: PAUL R. MATT - DEC. 1964





# Year of the Retractable

Close-up of retract gear installation Whit Stockwell's Pagan. No door or fairing is used. Power is 180-degree servo. Two-wheel gear needs thin wheels near leading edge.

For the most points in Scale and optimum performance in Stunt, retractable landing gears are becoming a necessity! The survey considers both old and new commercial systems.

**HOWARD McENTEE**

Photos by Frank Pierce

RETRACT GEARS have been on the market for over ten years, yet they have not become popular. Although they enhance performance, added weight and cost, plus possible unreliability, have prevented wide acceptance. However, the 1969 World Championship RC Stunt win of Bruno Giezendanner focused attention on them because of improved perform-

ance. The 1970 competition season may be the "Year of the Retractables."

They do reduce drag, although no figures on drag reduction for typical stunt planes have been seen. Most stunts are sleek, with low drag, except for that fixed tricycle landing gear! Those who have flown RLG (retractable landing gear) say the way planes go through tough maneuvers with the gears folded is a revelation. Observers can see a plane jump forward when the LG retracts!

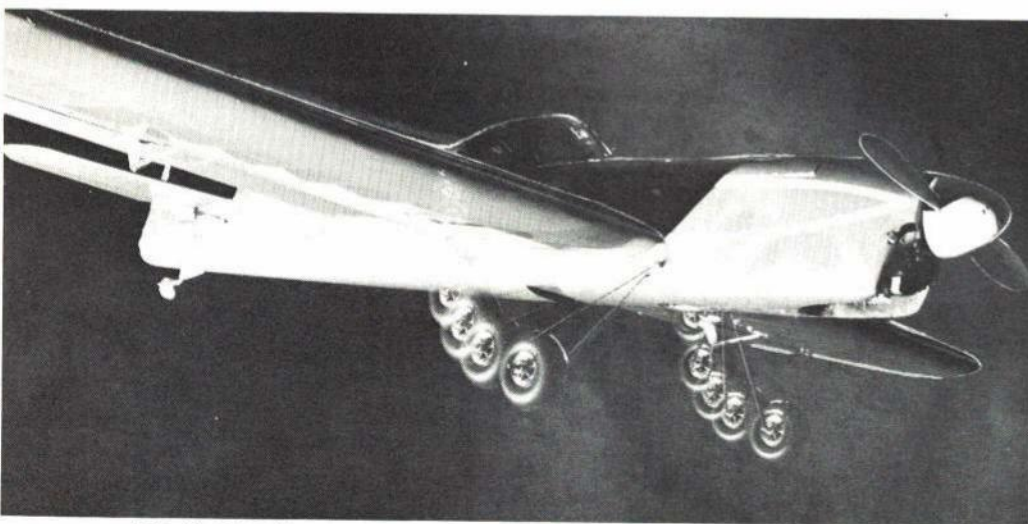
The RLG field divides into three distinct types: electrically-driven systems with motors built into each wheel unit; pneumatic systems which also have a power unit for each wheel; and non-power-equipped wheel units. External

servos are applied to work one or more of these, and almost any servo can trigger the units which have their own built-in power—electric or pneumatic.

Switches or valves require only a few ounces of operating power at the most. It is practical to operate electric systems from a special amplifier hooked to an unused control on a multi-channel system. Or simply link the switch or valve to the throttle (or other) linkage. Wheels-down seldom is used unless the engine is in low throttle. For takeoff, arrange the linkage so that the throttle, or the linkage itself, goes 80% of the way to wide open, then advance it the remaining 20% to actuate the retracting switch or valve. The wheels can be dropped at any desired lower throttle position.

For RLG's that have no built-in power or spring assist, standard servos should be avoided. Needed here is a rotary-output servo that can provide 180 degrees rotation of the output disk (Fig. 1). While most LG units have internal locks that take all landing shocks off servo and linkage, these locks may not always work. If the gear goes down, for example, but fails to lock, a rough touchdown can put a serious load on the servo gearing and even the motor. Any shock is taken entirely by the servo output disk and, possibly, its shaft. If these are sturdy enough, no harm can be done to the servo.

Many servos do not have enough throw to operate RLG's directly, and some may lack necessary power. Most landing gear servos now marketed (EK Products, BK Model Products, Kato Model Aircraft, Royal Products, Kraft, Pro-Line, and Orbit) have the desired angular rotation and sufficient power. With careful attention to attaining friction-free linkage, and with shorter LG



Editor's RC Nobler uses much modified Posittract to pivot the gear legs at point of exit from fuselage. Looks good in flight and raises the center of drag.



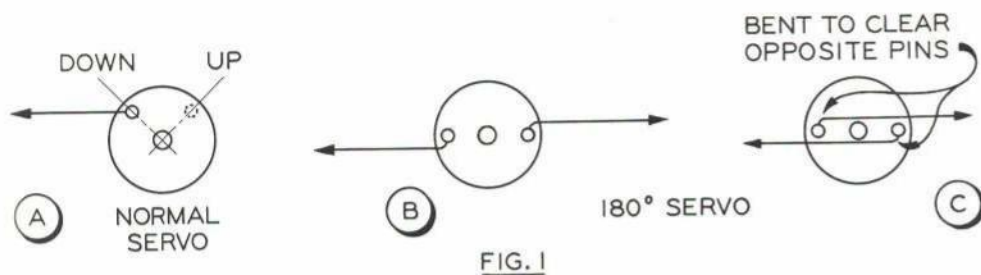


FIG. 1

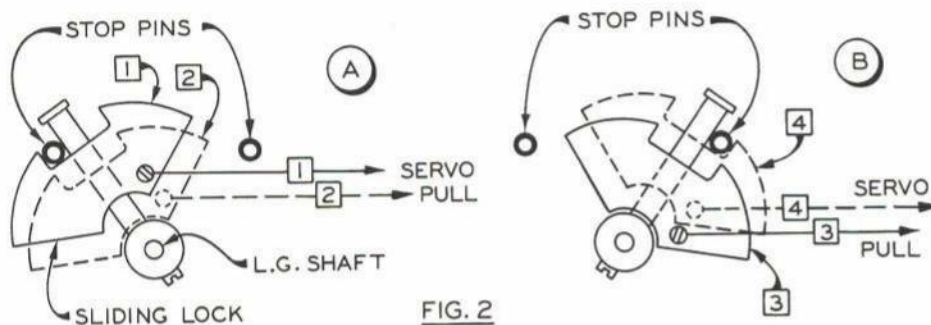


FIG. 2

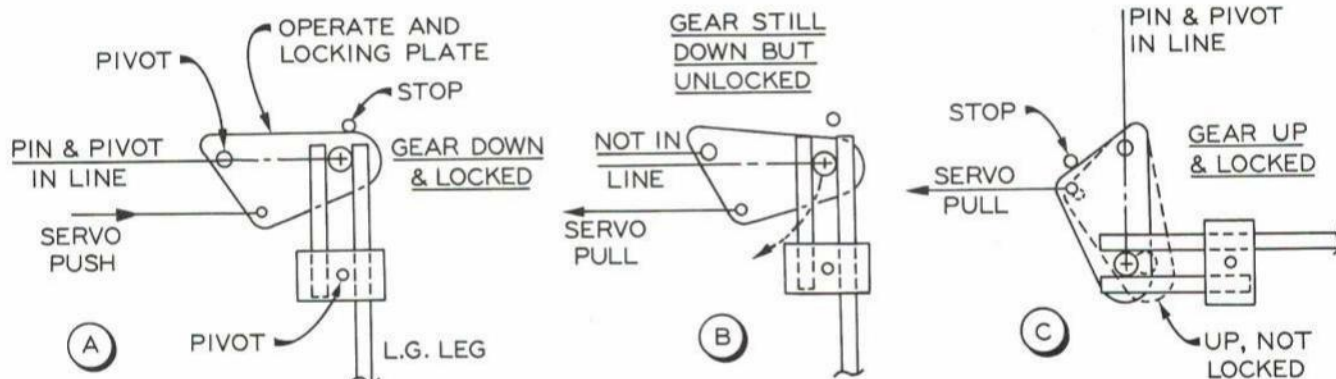


FIG. 3

legs and smaller wheels, one possibly could operate a trike RLG system from a single such servo. However, it is preferable to utilize one servo for the nose gear—this leg is often longer and heavier than the main gears—and another servo for the two mains.

Each of the servo systems has its pros and cons. Generally, pneumatic units are larger, and sometimes heavier, than electric units. Those that work from engine pressure require no added power. However, newer systems that work from compressed gas must carry this gas in an extra container. Such systems generally operate on Freon gas, widely used as a refrigerant. Some modelers have found that in cool weather several operations of the system can cause it to "freeze" to a modest extent. RLG systems normally operate only once at the beginning of a flight and once at the end, so this may not be a great problem.

Overall weights of the system vary greatly. When figuring weight for some RLG's, one or more servos, a switch (or valve), and perhaps separate servo batteries must be added. If it is possible to carry the weight, separate set of cells

should always be used for electric servos, in addition to the normal control system power pack. Not that the power pack can't stand the extra drain; it is brief and only needed twice per flight. But it is a mechanical-electrical fact that RLG servos can jam. The lighter-weight 450-mah nickel-cads recently introduced by Gould are ideal, alkaline pencils probably could be used satisfactorily too.

Electrical noise could bother digital receivers. The only electrical RLG's in this survey have capacitors across the motor brushes and low-resistance radio frequency chokes in the motor leads. Modern digital equipment systems are not as sensitive to such interference as the early ones, which probably is why all-metal retract units are now usable, whereas they might have upset early digital receivers.

Even the best-engineered systems can develop bugs. The average RC'er can do things to equipment that the designers never thought of! Probably the best way to check the various retract systems is to "Ask the man who owns one." Attend the larger Stunt contests, observe which RLG systems are in use and how

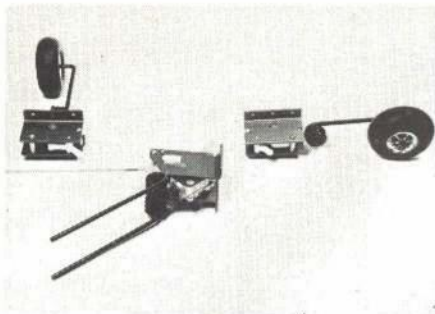
they behave, and ask the users for recommendations.

#### Unit Descriptions

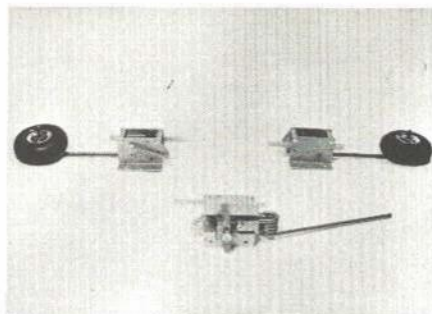
THE BK UNITS work on such a simple principle that sketches of the action (Fig. 2) are included. BK RLG's have only two moving parts, yet give smooth and positive action. Bill Bertrand introduced this scheme of operation back in 1965; sketches appeared in AAM (Ref. 8). BK has simplified the arrangement mechanically. In Fig. 2A the 1's indicate one extreme of motion—gear either up or down and locked. Operation is as follows: the semicircular block slides down and away from its lock pin, then moves the gear through 90 degrees to the opposite stop pin and the block slides diagonally upward until it locks the action again. Thus, a continuous servo pull unlocks, moves the gear leg 90 degrees, and relocks—exactly the same going either up or down.

The BK units are constructed of heavy 1/4" linen phenolic. Bearings are holes in 1/8" aluminum channel, which also provides mounting. LG legs have two-turn coils of 5/32" music wire and a slight offset bend. However, they are left

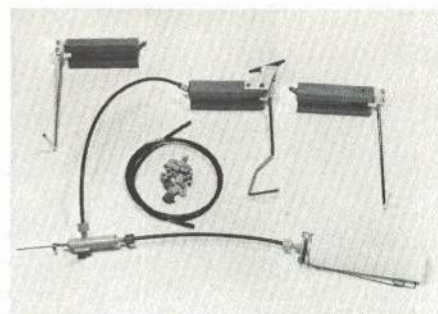




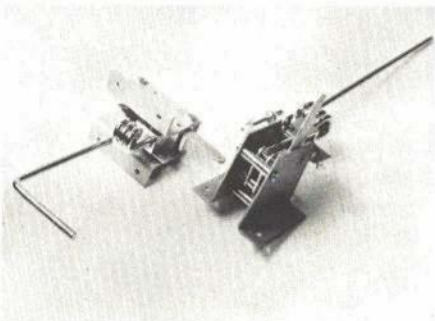
Royal Products RMK special.



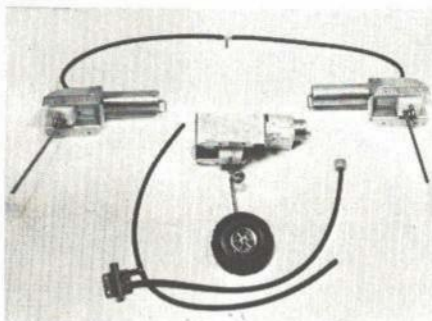
Selectronics CAS System.



Nelson Model Products Rowan.



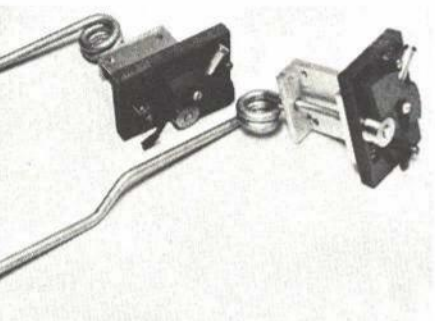
Technisales KDH German units.



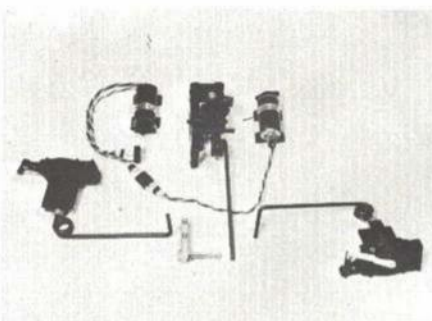
Never Fail retractable gears.



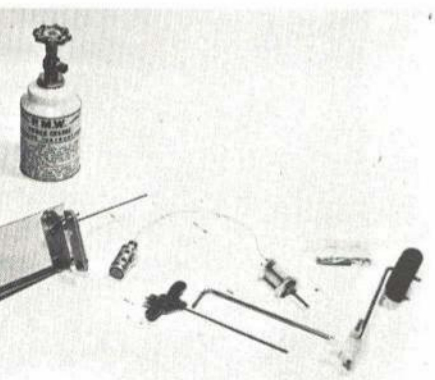
Wing Mfg. Posittract nose unit.



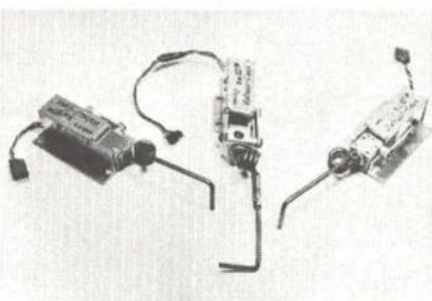
BK Model Products main gears.



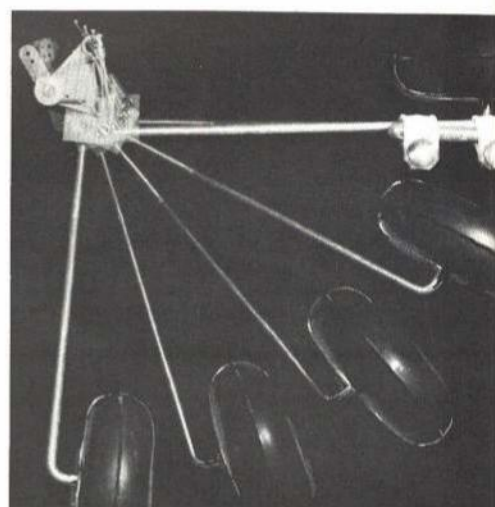
Royal MK and 180-degree power servos.



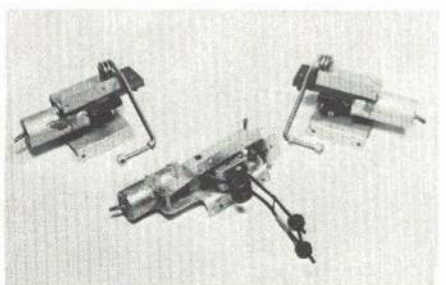
P.M.W. power unit, ram, airborne cylinder and P-40 gear on left and P-51-type gear at right. No spring assists.



Editor's old DMECO units are modified. Nose gear was bolted to engine's backplate. A sequential system.



English Micro Mold gear from Bob Holman is unusually simple. Torsion bar mounted.



Pneumatic Cletus Brow system operates from engine crankcase pressure.

straight on the end and may be cut and bent to suit. Some hints for improvement with a counter spring appeared in AAM (Ref. 9).

THE CLETUS BROW SYSTEM, no longer marketed, has seen much use by prominent fliers. Each unit has a bent frame of thin sheet aluminum, which holds the operating cylinder and the gear leg mechanism. Nose gear is steerable and is a two-leg type utilizing 3/32" wire. The legs lock solidly when down, pneumatic pressure holds them up. As noted above, the wing gear units are based upon the BK mechanism, but the locking feature with gear retracted has been eliminated. A small valve was sup-

plied to control pressure bled from the engine crankcase to the cylinders. As with similar pneumatic units, if the engine stopped during flight, spring pressure, assisted by wheel weight, was expected to force the gear down and lock it.

THE DMECO ELECTRIC UNITS were simple and rugged; nose and wing units were almost the same, easily convertible from one to the other. A rugged aluminum extrusion formed the frame and metal gears were utilized. Limit switching was built in. The motors always rotated in the same direction; and the current drain of a single unit could rise to 1 amp or more when raising the wheel. Therefore, switching was arranged to move the wheels in sequence; one was almost completely moved before the next in line started. Cycling was so rapid that it looked as though all the wheels moved together. Some users had trouble with the gears getting out of sequence—one up and two down, for instance. Thus, some installed separate batteries (Ref.



SPECIFICATIONS TABLE								
MAKER (IMPORTER)	TRADE NAME	NOSE GEAR WEIGHT	MAIN GEAR WEIGHT	TRIKE SYSTEM WEIGHT	MAX. DIM. NOSE UNIT	MAX. DIM. WING UNIT	TRIKE SYSTEM PRICE	REMARKS
BK MODEL PRODUCTS	BK	NONE YET	2.55 OZ. EACH	5.1 OZ *	NONE YET	1-1/2 X 1-3/4 X 2"	\$14.95 *	NO NOSE GEAR AVAILABLE
BOB HOLMAN	M.M.	NONE YET	2.96 **	5.92 OZ. PAIR	NONE YET	1-3/4 X 2 X 1-3/4"	\$20.00 PER PAIR	NOSE UNIT NOT READY YET
CLETUS BROW	BROW	4.7 OZ.	3.43 OZ.	13.0 OZ.	2 X 6 X 2-1/8"	1-5/8 X 2-1/2 X 4-1/2"	NO LONGER MADE	WING UNITS CONSIDERABLY MORE COMPACT
de BOLT MODEL ENGINEERING	DMECO	5.0 OZ.	4.9 OZ.	15.0 OZ.	1-1/8 X 3-1/2 X 1-1/2"	1-1/8 X 1-1/2 X 3-1/4"	NO LONGER MADE	NOSE AND MAIN UNITS ALMOST IDENTICAL
NELSON MODEL PRODUCTS	ROWAN	3.1 OZ.	2.57 OZ.	11.17 OZ., FULL TANK	2 X 5 X 1-3/4"	1-1/8 X 1-3/4 X 4-7/8"	\$89.95	PRICE INCLUDES 4 OZ. TANK OF GAS
NEVER FAIL RETRACTABLE LANDING GEAR COMPANY	NEVER FAIL	6.2 OZ.	4.8 OZ.	16.8 OZ.	2-1/2 X 5-1/2 X 2-3/4"	2 X 2-1/4 X 8-3/4"	\$70.00	WITH WING UNITS THAT RETRACT WHEELS STRAIGHT BACK, \$85.00
P.M.W.	P.M.W.	NONE YET	NONE YET	1.3 OZ. EMPTY	NONE YET	NONE YET	\$38.50	FILLED CARTRIDGE RAISES WEIGHT ABOUT 1/4 OZ.
P.M.W.	PR-1	NONE YET	2.0 OZ.	4.5 OZ *	NONE YET	1-3/4 X 1-3/4 X 7-3/4"	NOT AVAIL.	TORSION BAR INCLUDED IN LENGTH BUT NOT OPERATING RODS
P.M.W.	PR-2	NONE YET	3.8 OZ.	7.9 OZ *	NONE YET	1-1/2 X 4 X 7"	NOT AVAIL.	PLY MOUNT INCLUDED IN SIZE BUT NOT OPERATING RODS
ROYAL PRODUCTS CORP.	MK	2.95 OZ.	2.0 OZ.	6.95 OZ.	2 X 3-3/4 X 1-3/4"	1-1/2 X 2 X 3-1/2"	NOT AVAIL.	TWO MK SERVOS ADD 4.1 OZ. TO SYSTEM WEIGHT
ROYAL PRODUCTS CORP.	RMK SPECIAL	4.2 OZ.	2.5 OZ.	9.2 OZ.	2 X 2-1/4 X 1-3/4"	2 X 1-1/4 X 1-7/16"	\$34.90	SYSTEM WEIGHT LESS SERVOS; RMK SPECIAL TWO SERVOS ADD 4.1 OZ. TO COMPLETE SYSTEM
SELECTIONICS COMPANY	CAS	3.5 OZ.	2.85 OZ.	9.2 OZ.	2-1/8 X 1-1/4 X 1-7/8"	2-1/8 X 1-1/4 X 1-7/8"	\$43.90	SIZE DOES NOT INCLUDE OPERATING ARM PROJECTION
TECHNISALES	KDH	4.1 OZ.	3.05 OZ.	10.2 OZ.	1-7/8 X 2-1/4 X 1-7/8"	1-1/4 X 2 X 1-7/8"	\$66.90	PROJECTING LINKAGE ARMS NOT INCLUDED IN SIZES
WING MFG.	POSI- TRACT	3.67 OZ.	3.60 OZ.	10.87 OZ.	4-1/4 X 2-1/2 X 2-1/2"	2-1/2 X 2-1/2 X 4-1/2"	\$57.90	DUST COVERS, 95¢ PER RLG UNIT
* TWO WING UNITS ONLY. ** LONG TORSION BAR INCLUDED IN WEIGHT BUT NOT IN SIZE.								

1) and altered switching to move all wheels together.

The remedy for these rugged and simple units is to install in each the small motor used in the Orbit PS-4 servos. The larger motor used in their PS-3 servos can be adapted, but requires much filing on the case. Order these motors from the factory, specifying long shafts (shafts are cut short for servo use). With these lower-drain motors, all servos could be operated together, keeping the battery drain within reason and eliminating the out-of-sequence bugaboo. Hal deBolt suggests an Ace RC amplifier (kit #25K108) to operate the modified servos direct from an unused digital receiver channel; this amplifier was intended to power electric brakes.

THE KDH UNITS, a German import, are entirely metal, beautifully made, all parts plated or anodized. Side frames are aluminum. Nose and main gears are somewhat different, although both work the same. These gears lock both up and down. Operation of the main parts is shown in Fig. 3. Servo linkage is arranged to keep a little pressure on the triangular plate, so that it will stay firmly against its stop pin. When locked, the triangular plate pivot and the heavy peg on this plate are in line; all shock

is taken between these two points, none on the linkage.

These RLG units have adjustable coil spring assist. The nose gear requires about 3/4" linkage movement for full cycling, the wing gears about 5/8". Keep this in mind when mounting or the linkage won't come out right. The nose gear mounts to the firewall and is steerable. Technisales will stock their Cushionaire knee-action steerable nose gear strut to fit the KDH unit.

Another style RLG unit by KDH, intended to retract two wheels rearward, is fine for pylon racers. New Mini units will soon be available in the same design, but about 20% smaller all around.

MICRO MOLD UNITS are an English import, very compact and light. At this writing, only wing units are available, but a nose gear is coming soon. The entire mechanism of the wing units floats on a 6 1/2" torque rod of 5/32" music wire. The units are mounted with these torque rods in the wings just as non-retract wing struts are normally installed. The maker furnishes routed hardwood strips for this purpose, as well as torsion rod clamps and screws.

At first glance these wing units look a little flimsy, especially compared to some of the larger units included in this

survey. Closer examination shows that all parts which support the wheels are amply strong, and the units should stand abuse well. Spring-assist is featured on wing units and is adjustable to stunt length and wheel weight. The units afford positive locking, extended and retracted. They require about one inch of servo movement. Units are right- and left-handed, wires are bent for wheels.

MK RLG's, distributed by Royal Products, are almost entirely plastic. The steerable nose gear is set up for firewall mounting. All units operate on the same principle as those of BK (Fig. 2). Main gears require about 13/16" linkage movement, nose gear about 7/8".

MK makes two difficult, highly-g geared servos, one for both wing units, and one for the nose unit. Those servos are quite compact, have 180-degree rotation and built-in limit switches. Switching is such that the main gear servo moves about halfway, then causes the other servo to move. With two wing gear units and three-in. Lo-bounce wheels, maximum current drain of this one servo was 175 ma, which came as the gear neared up position, on 2.4V. There is no spring assist.

Servos utilize the same type of motors  
(Continued on page 58)



# Spinks Akromaster

60-powered model has all the fine aerobatic abilities of its full-size counterpart.

Lines are simple and easy to duplicate.

**ROBERT SCHULTHEIS**

AFTER LAST SUMMER'S air show at Rockford, a flying buddy told me about a slick white aerobatic ship he'd seen. Not too good at names, he called it a Schlitz or Schmitz Akromaster. Well, I like planes such as Chipmunks, Zlins, and Yaks, so this was a natural for me. Then AAM (Feb. 1970) published a detailed article and a beautiful scale three-view of the Spinks Akromaster. I was hooked!

The bomber I was building was set aside, and I started drawing this pretty ship with its perfect RC Class III proportions. Except for the 520-sq.-in. wing area, the Akromaster has all the right moments. The only curve in the whole plane is on the top of the fuselage.

The symmetrical wing, as experience and other flier's comments indicate, makes for better aerobatic models. The real plane used the semisymmetrical NACA 2413. The tail group is scale size. A few builders may question the area, but those doubts are completely dispelled after the first flight. That little stab and big elevator do a fine job.

Another unusual feature is a fuselage six inches wide. Try to put that in an old multi-cradle! I usually start the motor with the plane inverted on someone's knee or in a cradle, but it can be started right side up. Holding that wide oily fuselage requires a hand like Wilt the Stilt's, but it can be done.

## Construction

Start with 3/16 x 4 x 36" medium balsa sheet, add 3/16 x 2 x 17" doublers and 3/8 x 1 x 17" stiffeners. A piece of sheet about 2 3/4" long must be added at the tail. The 3/16" tail doubler will hold all this construction together. Mark former locations on the sides. Then, with sides stacked together, jig saw and cut to shape.

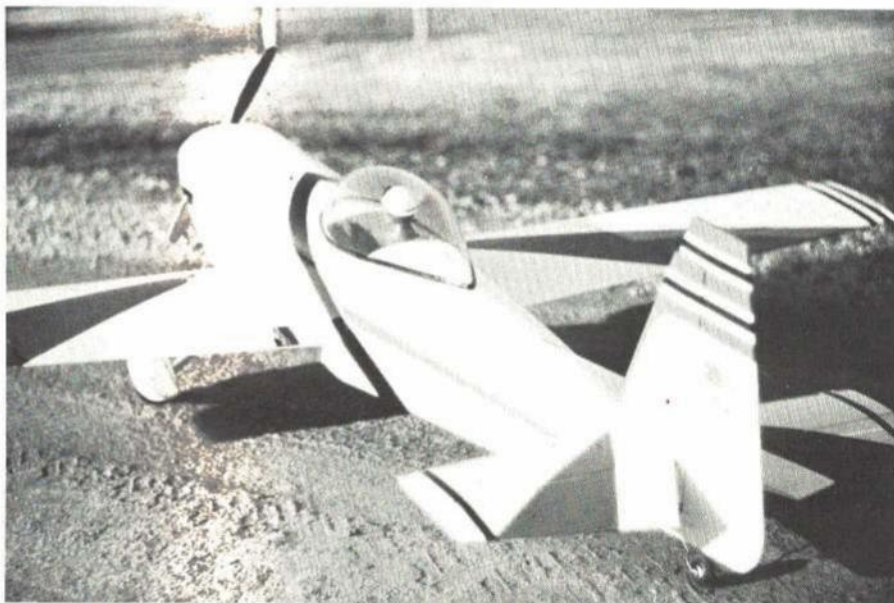
Formers 2, 3, and 4 are cut from 1/4" hard balsa. The 1/4" ply firewall (F1) can be added to the stack and all of them cut at one time. This keeps the width uniform and the notches in line. Now glue F2, F3, and F4 to one side. Also glue in F1 after attaching the motor mount. The Tatone mount is fastened to the firewall (F1) with 6/32 Allen bolts and blind nuts. Prepare the firewall to receive the motor mount and install the blind nuts. Cut 1/4" from the bottom of the Tatone motor mount, so that it will fit under the 1/2" balsa fuselage top. Drill another hole in the bottom of mount to replace the one cut off.

With the four forward formers glued securely to the sides, make a cut, about

two thirds of the way through, on the inside of fuselage side, behind F4. This can be done with a coarse hacksaw blade held in the hand. When the tail is pulled together, this cut enables the sides to bend at the angle shown on the drawing. It is not a smooth curve but a sharp angle. Both the three-views and photos show this.

Now bring the sides together at the rear and glue. Insert the tail block. Run some glue on the previously notched sides and attach some 3/4" triangle stock braces behind F4. Glue in F5 and F6.

The fuel tank is installed next, and the lower nose pieces glued in place. Epoxy 1/8" ply on front and rear of the  
(Continued on page 71)



ABOVE: The model's only deviation from exact scale is the use of symmetrical airfoil for serious-type stunting. Conventional landing gear works out well on this plane; takeoff and landing are bounce-free. Naturally, crosswind operation is tricky.

BELOW: Looks real, doesn't it? Maneuverability and precision are impeccable. A full-size Akromaster took third at recent Aerobatics Championships. U.S. won team first.



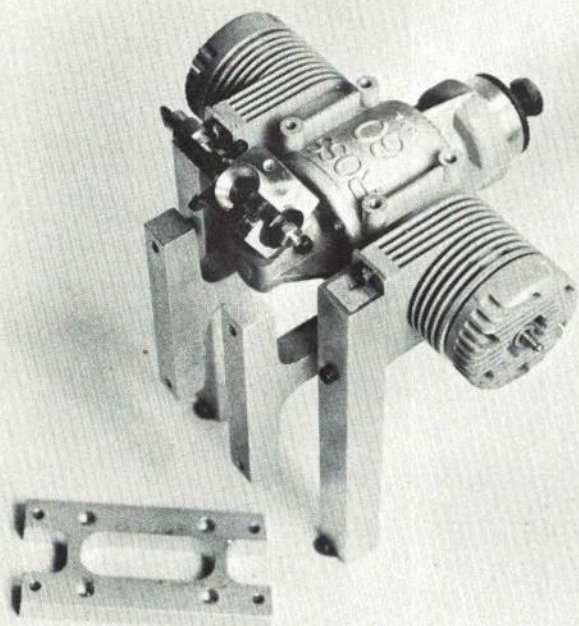
Rugged construction and wide fuselage characterize Akromaster. Scale three-view in background appeared in recent AAM article.





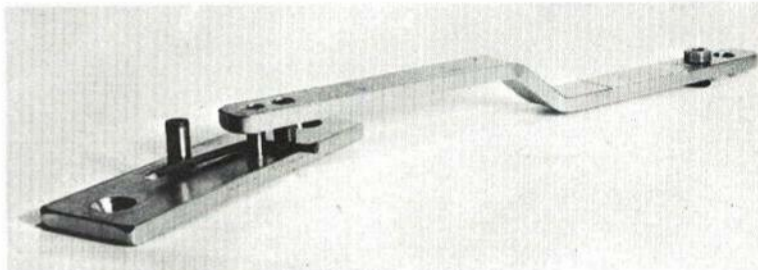


Concord and West Mfg./Ross Twin Glow 60. American-made RC motor is smooth-running, simultaneous-firing, common-centerline twin with special Kavan carb. Dependable idle and power for big props. Choice of mounting radial or beam, exhaust stacks or mufflers available. \$125. Concord and West Mfg. Co., 255-03 West End Dr., Great Neck, N.Y. 11020



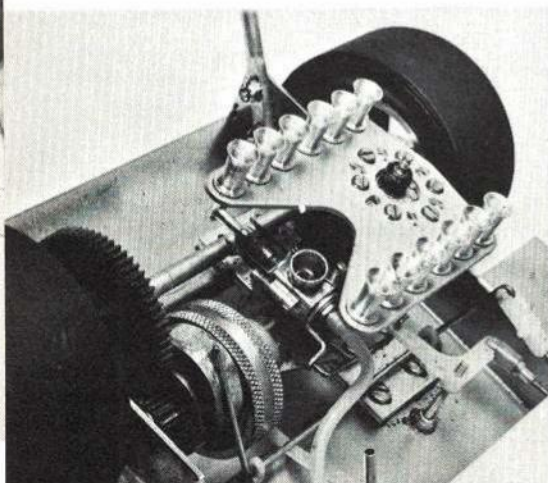
## NEW PRODUCTS CHECK LIST

FRANK PIERCE



Breiten Products/Right-angle wire bender. Precision tool permits accurate bending of 5/32" or 3/16" wire to smooth radius. Also available, coil-bender attachment for forming your own landing gear. Price, under \$7, depending upon wire gauge size. Details, write Breiten Products, 100 E. Byrd St., Appleton, Wis. 54911

Model Engineering/Wing carrier. Great for 'wagons or family sedan, heavy-duty brackets have no-slip surface, keep up to six wings up and out of the way. Quick to install, quick removal when not in use. \$9.95/set. Model Engineering, 3655 Calumet Rd., Decatur, Ga. 30034

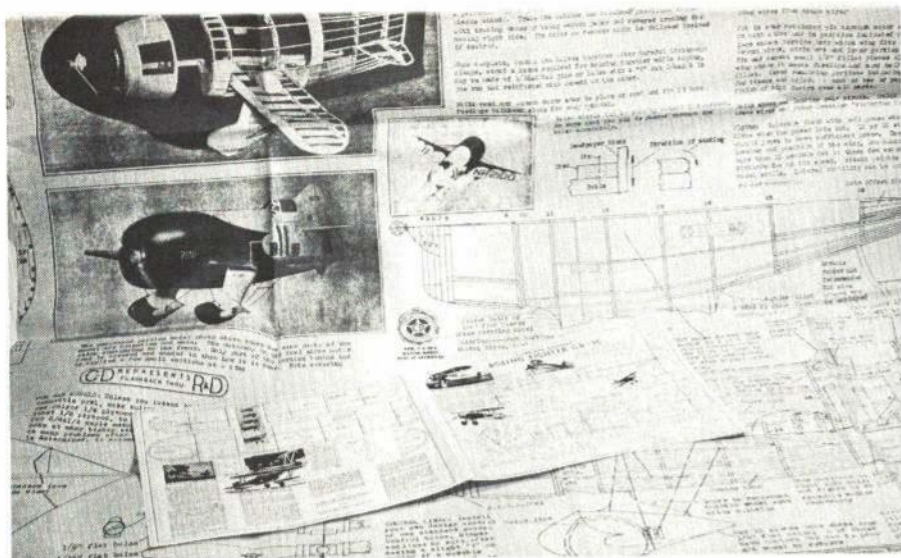


Dynamic Models/Race car heat-sink. Gets rid of heat in enclosed engine applications and adds note of handsome realism. Variable efficiency, sink can be used with asbestos washer for winter applications if desired. \$4.95 including washer. Dynamic Models, 13309 Saticoy St., North Hollywood, Calif. 91605

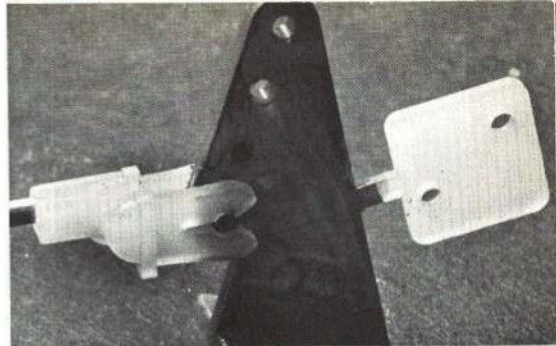
AAM's own/Far-out insignia. Show your true feelings for your favorite mag. Sport the Great AAM Bird roundel on your fuselage, field kit, car window. Instant-stick plastic, no water necessary. 3" diameter, 25¢. Also Tenderfoot insignia, great for dressing up Delta Darts, 15¢. Order direct from American Aircraft Modeler.





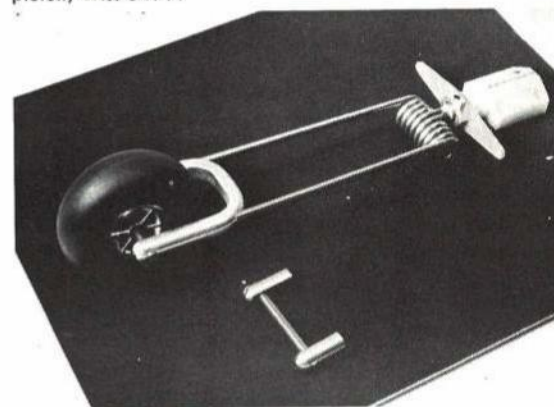


**Cleveland Model and Supply Co./Hundreds of plans.** Where else can you find 1 1/2" scale plans for GeeBee racer or detailed miniature drawings of rare early birds? Cleveland is now merchandising complete line of plans from '30's and '40's kits. Catalog provides complete listing. Cleveland Model and Supply Co., 4506 Lorain Ave., Cleveland, Ohio

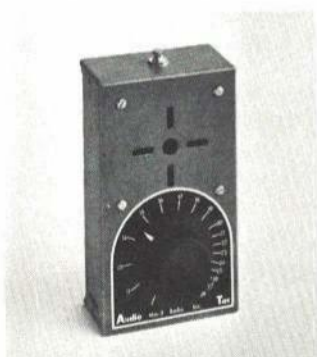


**Carl Goldberg/Snap'r Keeper.** Pushrods won't become disengaged when firmly locked in place with new CG product. Easy to install or remove. 4 for 50¢. Carl Goldberg Models, Inc., 2545 Cermak Rd., Chicago, Ill. 60608.

**Breiten Products/New nose gear.** Steerable, gear features quick disconnect lock for easy transport. Firewall-mounted, 3 oz. less wheel. Available with standard axle or curved yoke for \$1.90 extra. Gear with standard axle, \$7.95. Breiten Products, 100 E. Byrd St., Appleton, Wis. 54911

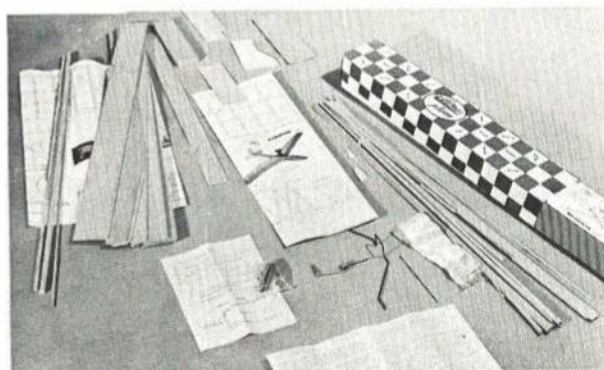


**Rexco/Permabond.** New semi-contact high-strength adhesive has many modeling applications. Sets firm in less than one minute, joins woods, nylon, metal, plastics, with either similar or dissimilar bonding. No heat or catalyst required. Complete data sheet provides all details. In several convenient sizes. Rexco Corp., 45 W. 47th St., New York, N.Y. 10036



**Min-X/Audio-tac.** Audio tachometer operates on two 9V cells, provides accurate calibration of engine revs to 1%. Peak out engine, tune Audio-tac to same note and read rpm's from calibrated dial. \$24.95. Min-X Radio, Inc., 8714 Grand River, Detroit, Mich. 48204

**Marlow Engineering/Shark rubber-powered.** One of a line of new lite-weight, built-up rubber-powered ROG's and gliders, kit provides detailed plans, all material, plus detailed instructions. For the successful Delta Dart graduate. Marlow Engineering, 6850 Vineland Ave., North Hollywood, Calif. 91605



**Dumas/Evolution trainer.** Shown in kit form, model can be flown in three configurations. Add wing-tip extensions and fly as 75" span, 09-powered RC trainer. Remove gear, add power pod and fly as thermal soarer. Or fly as hotter 48" span sport plane. \$19.95. Dumas Products, Inc., Box 6093, Tucson, Ariz. 85716



**J. W. Caler/New WW II aerobooks.** Two new ones from Kookaburra publications in Australia provide details on planes used in film Battle of Britain, and development of Hawker Hurricane. Both well detailed with lots of pix and three-views. Well printed with good color. \$1.95 ea. John W. Caler Publications Corp., 7506 Clybourn, Sun Valley, Calif. 91352









# Tardon

Attractive non-scale Formula II winner at '69 Nats is also a fine small-size pattern plane.

**JACK SABINE and BRUCE LUND**

TARDON II WAS conceived at 20,000 feet over Mexico, while Jack Sabine and I were returning from the 1969 Mexican Nationals. Jack had just won the Open Pylon event with his "Tardon." In Spanish, Tardon means slow or pokey. Surprisingly, some of the local Mexican contestants had come over to ask what it meant—seems our dictionary was for Castilian, rather than Mexican, Spanish.

Thinking ahead to the Nationals to be held in Philadelphia, we realized that Tardon needed modifications to fit the recently revised AMA rules. Should new wings be built to meet the 1½-in. rule, or should a completely new plane be designed? The frontal area of Tardon could be reduced by placing the cheek cowl down on the wing like a Rivets, and the wing could be moved up closer to the thrust line. We decided to modify the winning Tardon.

The 1969 Nationals were only days away when the redesigned plane was ready for testing. That first flight was all, or perhaps even more than, a modeler could desire. The ship handled like a dream, and no trim changes were necessary. The only problem was with the pilot, who has a habit of dancing or shuffling his feet during a test flight. Jack was a nervous wreck, but the Tardon made a perfect three-point deadstick landing on our 240-ft. strip.

This plane is fantastic. It demonstrated its high speed capability by qualifying at the Nats with a hot 2:06. Yet, with the engine killed it glides in for landing like a sailplane. It shows no tendency to fall off on a wing during low speed turns and, with the limited elevator throw, it will not stall.

When flying full-bore, the stability is phenomenal. It flies the pylon course as though programmed by a computer. One takeoff during the National finals was made totally blind. Jack's mechanic



Jack Sabine displays the fairly long high-aspect ratio wing which gives Tardon its fantastically quick pylon turns.

stood up in front of him just as the plane was released. Jack just pulled up and waited until he saw his orange and white bird over the heads of those in front of him.

Tardon II is an easy plane to fly, even for a beginner. Most Class A fliers would have no trouble handling it. It also can be an attractive aerobatic plane—but fast!

## Construction

Construction is somewhat more sophisticated and time-consuming than usual, but it is not difficult. The end results are well worth the effort. If possible, total weight should be kept under 5 lb.

**Tail:** The stabilizer is simple to build, with 1/16" sheet balsa covering a Warren truss frame. Note that spruce spars are used and that the leading edge is quite tapered. The center of the bottom sheet is slotted to allow the stabilizer to slip over the sub-fin. When making this assembly, epoxy the joint thoroughly, since quite a bit of flexing takes place here. However, after a year of flying, our Tardon's joint has not failed.

The elevators are made from a sheet of ¼" balsa with ¼" plywood joining them. Vertical fin and rudder construction is similar to that of the stabilizer. The direction of grain and type of balsa are most important; choose the wood carefully and keep it light. Be sure to use toothpicks when securing the rudder hinges, particularly the bottom hinge.

**Wing:** The original Tardon II had a foam core wing. Templates are shown on the plans for either foam or built-up construction. When foam is used, leave out the ¼" x ¼" wing spars. If the equipment necessary to build foam wings is not available, use the stack method for cutting ribs. Cut a plywood or aluminum template of the root rib and the tip rib. Between these add 14 pieces of

1/16" sheet balsa. Tack-glue all these together with Ambroid and, when dry, carve down to the template. Then slip a razor blade between the ribs to cut the glue joint. Draw the centerline on each rib, as well as a centerline the full length of the ¼" x ⅝" leading edge and ¼" x ¼" trailing edge.

Pin the leading edge to a flat work surface, using ½" blocks under it. Pin the trailing edge to the surface, with 11/16" blocks beneath it. Make sure the centerlines face the ribs. Insert each rib in its proper place and glue with Titebond. Check the alignment of each rib centerline in relation to the leading edge and trailing edge centerlines. Allow this construction to dry overnight. Then add the ¼" x ⅝" wing spars and 1/16" sheet webbing between them. Do not remove the wing from the table until the assembly has dried overnight.

Add hardwood landing gear blocks. Cover each wing panel with 1/16" balsa. Using ⅜" select grade balsa, add the wing trailing edge and ailerons. Install the aileron torque arms and ⅝" brass tubing. Install wing tip blocks. No dihedral bracing as such is used. Simply epoxy a 4" piece of 2-oz. fiberglass cloth around the center of the wing, after blocking the tips up ¾".

After the epoxy has cured, the cutouts for the fuel tank and aileron servo can be made. Give the completed wing a final going-over with sandpaper, then make the cutouts for the landing gear. Remove the ailerons from the wing and add the hinges.

**Fuselage:** The fuselage sides are cut from 3/32 x 4 x 48" balsa. Cut out for the wing but do not cut through to the bottom of the fuselage. This will be done later. Using contact cement, glue the 1/32" sq. plywood and the 3/16" sheet balsa doublers to the sides. Add the ¼" plywood engine mounts, ⅜" triangles, and 3/16" sq. pieces to each side. After both sides have thoroughly dried, pin the bottom of each fuselage side to the plan, starting at the tail. Insert the 3/16" sq. pieces across the fuselage top and bottom.

Now add Former F4 which has been cut from ⅝" plywood. Install the vertical grain portion of the sub-fin at this time, checking alignment carefully. Then pull the nose together and add Formers F2 and F3. This is the best time to add the ⅜" triangle stock between Formers F2, F3 and F4 and the fuselage sides. Glue the 3/16" sheet turtle deck and the ¾" nose block in place.

After drying overnight, the fuselage may be removed from the building board, turned over, and the bottom glued in place. Add enough ⅜" sheet blocking to the nose to allow a good profile after carving and finish off by gluing F1 in place. Round all corners as much as possible and rough-sand.

Cut out fuselage sides for the wing. Glue Former F4A with wing hold-down fitting in place. The fuselage is fitted to the wing, with 1/32" clearance allowed along the top of the wing for the plywood wing saddle. When the wing fits to satisfaction, glue the plywood saddles to the fuselage sides. Hold them in place, with Saran Wrap on top of the wing, until the glue has dried. Next, the cheek cowls are cut and rough-carved. Sand them to approximate shape, hollow out and glue in place. Form the remainder of the wing fillet with Epoxolite putty. Fit the section of fuselage under the wing in place. Glue to the wing,

(Continued on page 76)

Formula II planes with 600 square inches are fairly large. Because of the drag of the larger wing, well-thought-out streamlining is essential. Fuselage profile shows careful designing.





## R/C DON LOWE General Correspondent SPORT and PATTERN

**Proposed Channel Changes:** The FCC has proposed changes for the 72-75 MHz ranges so that two of the present spots would be shared with other model users and two new channels assigned to non-aircraft application. AMA is actively preparing arguments to change this rules proposal. These changes were suggested because of the recent rapid growth of RC car activity. Many modelers want to use their airplane systems in a car on 72. Others feel it is discriminatory to deny 72 to non-aircraft users. It is—and the reason is safety.

Whatever the outcome, consider that, because of the close-range operation of RC cars and most RC boats, 100 milliwatt transmitters are more than adequate on any frequency. And with the 27 MHz band, any frequency within the band may be used by a transmitter of less than 100 milliwatts. That means fifty channels or more. We think this band is where all non-aircraft use belongs. Fifty channels for less than 100 milliwatt transmitters is enough.

**Careless Frequency Control:** In the Crescent City R/C Club's newsletter, "The Flyaway II," Ron Romeo reports "two planes shot out of the air as the result of carelessness with the frequency clothespin. The plane in the air had the pin in both cases, and in both cases the guilty party was an experienced flyer." Unfortunately, such carelessness is much too common!

Most clubs have ground rules to prevent simultaneous operation of transmitters on the same frequency. Some use a colored flag on the transmitter to signify frequency, but, are fliers color-blind or too lazy to observe what colors are flying? Most clubs use a clothespin system, requiring the acquisition of an appropriate-colored pin and affixing it to the transmitter prior to turning it on. Other clubs impound transmitters, even during regular weekend flying.

The problem of frequency control will always be with us, human nature being what it is. But if somebody violates the rules and washes out some hapless flier's hard-won pride and joy, is it enough to say, "Gee, I'm sorry!" Personal and financial responsibility is assumed for the careless wiping out of other kinds of property such as automobiles. Why shouldn't such responsibility extend to models? Obviously, clear-cut operational ground rules and clear evidence of fault must be established before judgment can be made. What do you think?



Kapiolani RC Club of Honolulu, Hawaii, flies at Diamond Head Crater. Models are mostly high-wingers for off-grass operation.



**Selectronics retract gear in a Lanier Citron is unique in many ways. For example, nose gear retracts forward, mains retract outward. Mains are mounted on plywood base without spar support. Flies great.**

Here are several suggested operational ground rules. (1) Never operate a transmitter without a frequency flag. Write frequency numbers on flag to prevent color confusion. (2) Use the frequency and color-coded clothespins. (3) Impound transmitters with antennas removed. (4) Require fliers to operate from a designated area so that it

## R/C FRED MARKS Specialist Correspondent TECHNICAL ITEMS AERODYNAMICS

**A Digital Addition:** An auxiliary function for digital equipment can be added to existing radios inexpensively and simply. Its application can be to throttle, flaps, landing gear or other auxiliary functions. Furthermore, it requires omission of the digital information for only about half a second, just enough to start it on its way to the next position. During this half-second, the regular digital servos stop for an unnoticeable moment.

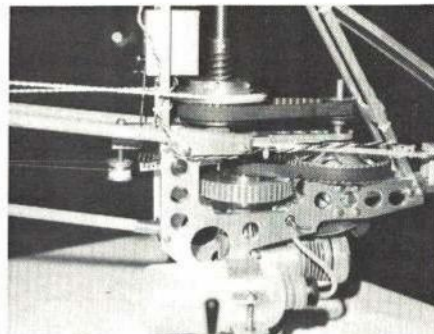
An S-4 Controaire servomechanism with a small switcher board, designed by Ken's RC, is used in place of the normal feedback potentiometer. A two-transistor POD is used to control the servo.

The schematic shown is for a negative-going input signal. From this figure it can be seen that the input pulse (taken from a servo signal lead or at any convenient and compatible point on the digital decoder) is coupled via a steering diode to the 5.6 mf capacitor. As long as pulses are present, the first stage transistor is biased off by the 100 ohm resistor to its emitter. Upon omission of the pulses, the first transistor is biased on via the 2.2K resistor and, in turn, drives the output transistor into full condition.

As soon as the servo starts to move, the potentiometer wiper (normally used for feedback in the digital-type application) makes contact across the switcher plate. The plate is mounted where the pot element is normally located. This retains bias on the output transistor to full conduction, even after the pulse train resumes, until the switch plate contact breaks. The plate shown is for three positions to be used for throttle. If it is to be used for a two-position function, e.g., landing gear, the area of the switcher arc identified by a black dot should be blacked out prior to making a photo-etched p. c. board.

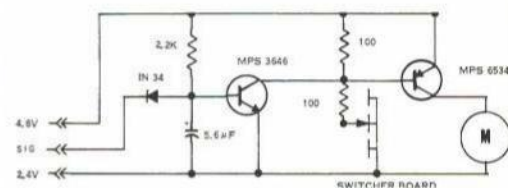
The POD can be used with a positive-going input pulse by simply making the mirror-image p. c. board and using MPS 3638A and MPS 6531 transistors in place of the MPS 3646 and MPS 6534, respectively. All other component values are the same.

The unit built and tested was used with

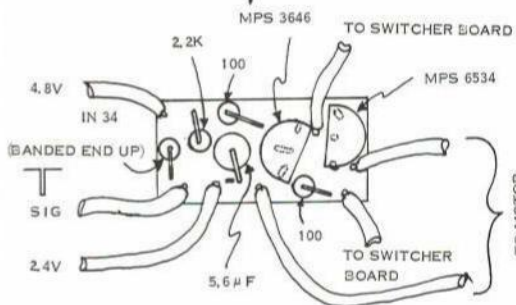


Ernie Huber, who is a machinist, has taken up the helicopter challenge. Nice work.

is easy to see who is flying and to check his frequency. This also prevents fliers from being clobbered by aircraft taking off and landing. (5) As an added precaution, always turn the receiver on first and note its operation. (Continued on page 68)



Schematic for digital POD by correspondent Marks is for negative-going sig. input.



PC board layout is simple, and with so few parts, assembly is easy.

the Controaire Digit Miglit single-function digital system and works happily with other negative-going pulse digital sets. Both positive and negative pulse are available on the Digit Miglit. Its installation will be described next month.

The preceding brief description is not intended to be a construction article. It is recommended for the tinkerer who knows, for example, where to pick up the power leads and signal leads for his radio. Furthermore, the location at which the transmitted pulse train can be interrupted within the transmitter using a normally-closed push-button must be known. In most cases, however, a duplicate servo plug on any channel provides the signal and power lead sources. The "enable" button on current digital radios for operation of buddy box or instructor/trainer system performs the pulse-stopping function at the transmitter.





## R/C GEORGE SIPOSS

### Specialist Correspondent R/C CAR RACING

**Tires:** The latest fad in tires is spongies. Since some sponge tires behave better than others, the best types are semihard closed cell neoprene rubber. They are responsible for an approximately 10% decrease in lap times and for more control. . . .

**Engines:** The most popular engine is still the Veco 19. An air cleaner must be used on the carburetor intake (see diagram), as well as a fuel filter. The latest fad is to machine off the cylinder head fins so that a flat aluminum plate can be mounted with the six head screws. Machined "velocity stacks" can be attached for a more authentic look. Such an item is available from Dynamic and fits most 19's. . . .

**Gas Tank:** The tank should be mounted so

Japanese jeep is for fun, not racing! Has differential, throttle, brakes, etc.

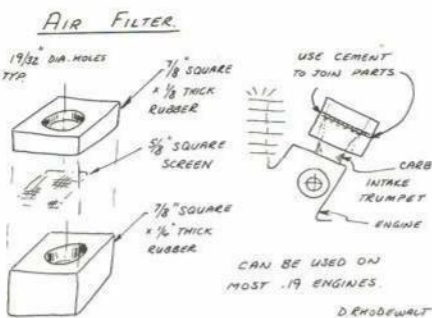
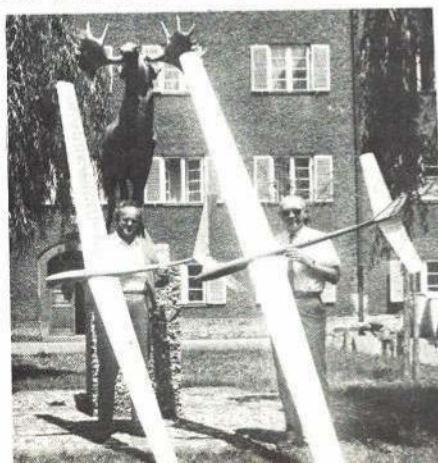


## R/C HOWARD MCENTEE

### Specialist Correspondent GLIDERS and FAI

**Useful Wing-Attach Method:** An arrangement utilized by Harley Michaelis to hold the wings on one of his large soarers worked, but he felt it wasn't practical. It was too difficult to run the 1/16" dia. lock wire through to the clevis ends, back in the dark area of

Wilhelm and Willoughby hold Flying Cucumber and Kurwi 68 Universal prototype.



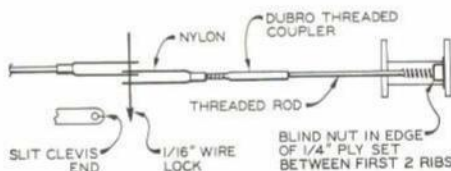
Amazing how much dirt gets into an engine. Simple filter eliminates problem.

that when it is half full the fuel level is about even with the needle valve on the carb. . . .

**New Clubs Forming:** Contact the nearest club. In the Philadelphia area, write Larry Robbins, P.O. Box 37, Warminster, Pa. 18974; in the Bay area, Ray Bell, 1082 Cascade Dr., Sunnyvale, Calif. 94087. . . .

**Shop Hints on Filters:** Don Rhodewalt makes a filter from a large piece of soft rubber, such as a pink pearl eraser, and a filter screen of fine wire mesh (use the screen from a faucet strainer). Cut out the rubber blocks so that the hole is equal in size to the neck of the carburetor. This way it will have to be stretched over the trumpet (intake opening).

In a pinch, a fuel filter can be made as follows. From a very fine mesh wire screen, cut out a 1/4 x 1/2" rectangle (experiment with the size to find one best suited to the fuel line). Roll this rectangle into a small-diameter cylinder, one-half inch long, and tuck it into the fuel line near the carburetor. Take it out occasionally, it's surprising how much dirt it catches during a typical race day. If the rolled-up screen is too loose to be effective, bend the screen in its center so that it will cock in the line.



Wing attachment method by Michaelis allows impact release but easy assembly.

the fuselage. However, with a few modifications to the installation, the idea became quite practical (see sketch). Guides inside the fuselage ensure proper wire placement. A slit end allows the clevis to pull loose in a bad landing or crash. This may ruin a clevis, but a new one is easily installed. . . .

**Father of the Kurwi:** Dale Willoughby, during a trip to Germany, visited Kurt Wilhelm, who designs and kits the Kurwi gliders. Wilhelm's Flying Cucumber has an odd fuselage shape and was built to test a V-tail installation on the same sort of glider. Although he has a complete wood-working shop in the basement, Wilhelm does much of the kitting work, including fiberglass fuselage manufacture, in his apartment. He uses epoxy for fuselage work. A lifetime model plane builder, Kurt seldom has time for flying any more, what with a full-time job and the great demand for Kurwi kits. . . .

**Computerized Scoring:** Pencil and paper toil by dedicated modelers' wives (or girlfriends) may come to an end, if more clubs follow lead of the League of Silent Flight. For their August Soaring Tournament at Livermore, (Continued on page 66)



Beautiful rocket-firing AM-1 Mauler by Bud Nosen. Fires individually or all at once.

## R/C CLAUDE McCULLOUGH

### Specialist Correspondent SCALE

**Swoosh:** Bud Nosen's Marine Mauler took first at the Des Moines Modelaires Pylon and Scale Contest June 27-28 with a demonstration of operating rockets. Contestants and spectators found the realism perfect—puffs of smoke on ignition, followed by a salvo streaking away.

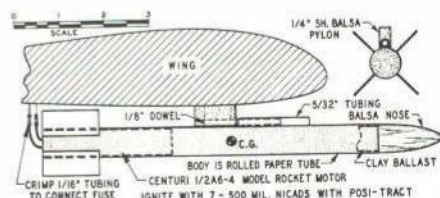
Unlike some earlier attempts with fireworks, Nosen's installation is well-tested, uses the safe and proved standard solid fuel model motors. To make certain that the rockets cannot be accidentally launched while handling, a thin music wire lock is strung through holes in the mounting tubing and dowels. A long ribbon on the end acts as a reminder, just as in full-scale practice, to arm the weapons before takeoff. An interlock on the transmitter auxiliary level to prevent inadvertent triggering would be a good addition. The rockets go where they are pointed and a dive attack puts them right on target.

Bud is adding a further feature on his Nationals entry P-47. Charges of flour will replace most of the clay ballast to simulate an explosion on impact. . . .

**Bigger Is Better:** There seems to be a trend to smaller RC scales with higher wing loadings. Details, external stores and thick paint jobs are crammed aboard as though control lines were going to be used. Given precise digital control, ample power and high pilot skill, it is sometimes possible to make a lead sled fly. More often the result—if it lasts through the test flights—is a jumpy bomb, a snap roll looking for a place to happen. Building to a larger size will tame such tendencies. The major advantage is reduced scale effect. A six-ft. span shows markedly better flight and handling characteristics over the same subject at five ft., even at identical loadings.

**Robin Lehman's 1/7th size Britten-Norman** Islander twin has been described in previous issues. Now he has produced a larger 1/5th version of the same design and is in a unique position to make comparisons. The weight went from 11 lb. to 19, but the wing loading dropped by 40%. The big job flies so well that it is hard to tell when an (Continued on page 68)

Rockets fired by Mauler, above, are made of paper and balsa. Commercial motor used.





# C/L BILL BOSS

General Correspondent  
SPORT and SCALE

**Slo-Moe:** This all-purpose plane was designed by Bob Sylvia, for use in slow combat, balloon busting, and as a stunt trainer. With a little extra work on the control system and an engine change, it also could be used in the Profile Carrier event. The plane has been flown by Bob and several of his fellow club members (Suffolk Wings, Long Island, N.Y.) since 1966. An excellent flyer, it has garnered many awards in slow combat and balloon busting at local contests. It even has been successful against the fast combat jobs.

Bob's plane features two innovations: a diamond-shaped airfoil and a two-piece fuselage. Both of these make for easy construction and great strength at the wing-fuselage joint. In addition, the plane can be built with standard sizes of balsa. The list of materials is simple: leading edge, 1/2" sq.; two wing spars, 3/16 x 3/8"; trailing edge, 1/16 x 1 1/2" sheet; tail assembly, wing ribs, and wing tips, 1/8" sheet; 3/32" plywood doublers; and a 3/8" or 1/2" plank for the fuselage; 1/16" sheeting for center wing planking. Miscellaneous items for landing gear, control system, hardwood engine mounts, plywood bellcrank mount, etc., also are required.

The diamond-shaped ribs (12 required), because of their long flat bottoms, can be pinned to any smooth flat surface. Therefore, alignment of all ribs, spars, etc., is easy. Space the two center ribs in relation to the fuselage thickness, since the fuselage halves must fit in properly between them.

After the wing is constructed, cut out fuselage halves and notch both halves at the proper locations to accept the wing's leading and trailing edges, and top and bottom wing spars. Cut the nose of the fuselage to size for the chosen engine (19 to 35).

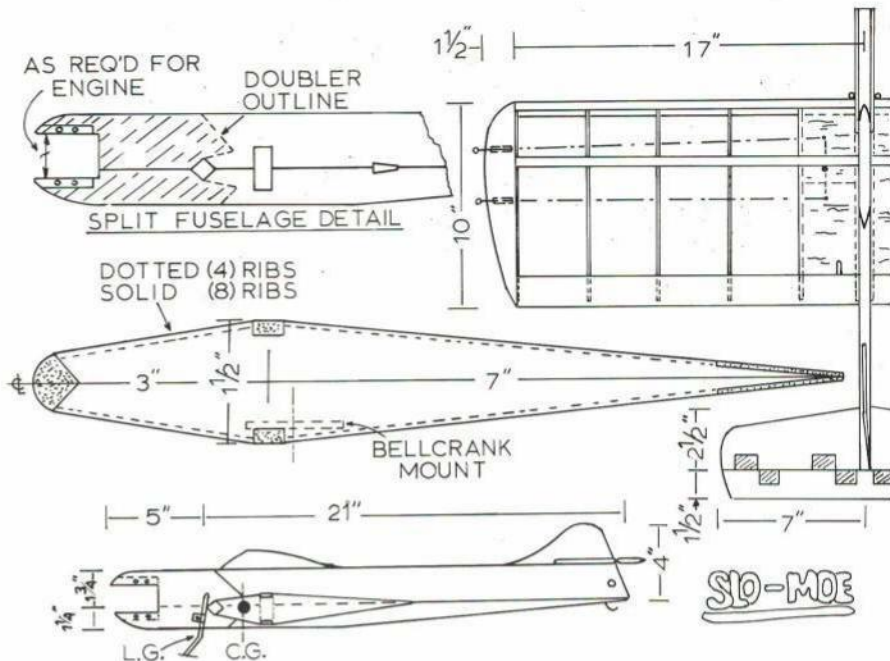
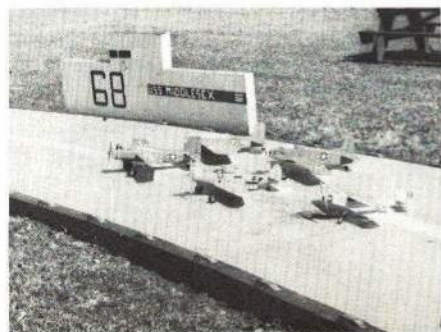
Next, cement fuselage halves into place between the two center wing ribs. Install nose doublers and engine mounts. Cut out and install rudder, stabilizer and elevator assemblies. Install bellcrank mount (1/8" plywood) in inboard wing sections. Landing gear, outboard wing weight, and tail skid complete the basic construction. Sand, cover and paint.

The Sloe-Moe has great stability, maneuvers well, and will take rugged handling from the novice. In the hands of the more experienced flier, it gives an excellent performance.

Bob will provide detailed construction drawings to those that want them. Write Bill Boss, care of AAM. . . .

**Pacifier-Type Fuel Tanks:** This item appeared in "Modeling's Liveliest Monthly Fish-wrapper" (newsletter of the San Jose Aero Modelers). Marv Wentz, Technical Editor,

U.S.S. Middlesex is pride of N. J. club. Group has excellent community relations.



Bob Silva's all-purpose Slo-Moe is about easy to build as any 19- to 35-engined plane. Diamond airfoil builds on flat board. For larger drawings write AAM.

describes the simple construction technique. Secure some gum rubber baby pacifiers and pull out the plastic ring and insert. Discard these parts. Next, cut some short lengths of 1/8" brass tubing, about 1/2" to 3/4" long. Insert the brass tubing into a length of black Veco fuel tubing which will reach from the spray bar of the engine to wherever the tank outlet is to be located on the particular plane. Insert the brass-tubed end of the black fuel tubing into the pacifier and bind off securely with a small rubber band. That's all there is to it. Make up several of them because they don't last forever. The big advantage of this type of fuel system over the usual metal-tank type is that the pacifier-type provides a more positive fuel flow, no matter what position the plane may assume during flight. . . .

Salute to Middlesex: Middlesex Modelers Inc. (Middlesex, N.J.) has 42 members, three of whom are girls and, with 21 adults and 21 Juniors, there's no lack of Junior participa-

tion here. The club maintains a minimum of four training ships for use by newcomers and those that can't afford a plane. On top of this, it pays all AMA membership fees for Junior club members.

Promotional activities of the Middlesex organization include static displays, club movies, and flying demonstrations for local orphanages, Boy Scouts, Lions and Jaycees. This civic interest has put them in a favorable position with local townfolk and has enabled the club to obtain a flying site that now has three 60-ft. circles, two of which have blacktop doughnuts. Two smaller circles are for O49-type flying.

Those who wonder how to promote a club, obtain flying sites, or encourage junior membership, might take note of how it has been done by the Middlesex Club—hard work, well-organized promotional activities, and some special attention to the newcomer. To the Middlesex Modelers, "Thanks for a job well done."

# C/L JOHN BLUM

Specialist Correspondent  
CARRIER and STUNT

**Stunt or Precision Acrobatics:** This column has provoked a welcome response from modelers who have flown aerobatic models. It is always surprising that so many build great stunt models, yet are not interested in competition. However, reasons for this attitude are not hard to understand! Rules changes are only part of the solution. By presenting ideas and theories received from all levels of interest, we hope to spark concern and reaction toward bettering the event.

By this time, a rules change may have eliminated appearance points. Al Sugar comments that "in the Chicago area, the appearance of the ship was the only determining factor." He and four other stunt flyers

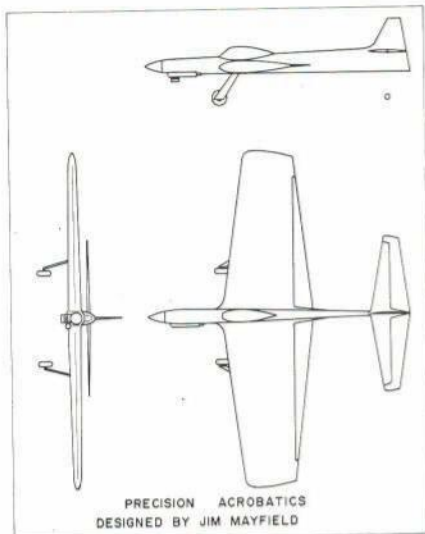
will not participate in the event until it is run under FAI Stunt rules.

Bill Noyes, in the SCCA Newsletter, suggests that all Southern California contests go straight FAI rules in Stunt. Certain elements in the St. Louis area promote the same philosophy. It's your event; consequently, it'll be what you make it. . . .

**California Stunt Model:** Jim Mayfield's new stunt model incorporates ideas evolved from his wide experience. It also meets coming muffler requirements—thus the exposed engine head and muffler, since muffled engines run somewhat hotter.

Other design characteristics, based on careful observation of what produces a winning combination of appearance and flyability, are: (1) swept-back rudders, which make inside corners appear round, while vertical rudders combined with straight fuselage make corners appear square; (2) the placement of the bubble canopy, which creates the illusion of the plane's pivoting around corners; (3) the straight fuselage, which emphasizes the straight sides of square maneuvers and level flight; and (4) a color scheme





Mayfield's new stunter is designed for mufflers and maneuver-appearance effects.

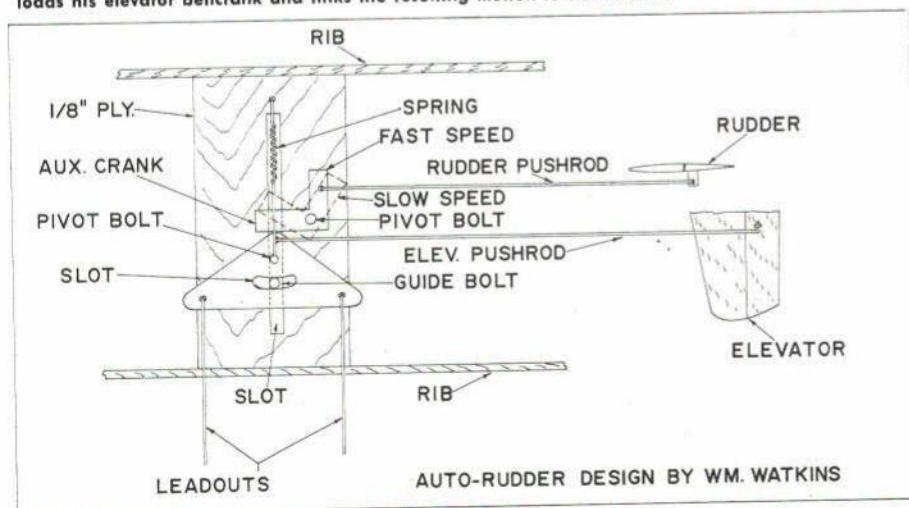
which adds to appearance in flight.

Jim feels the future trend in stunt design will be away from the jet look and toward a more functional design. He cites Bob Gieske's Nobler as an example. The model shown will be powered by a Fox 35 with muffler. Its weight of approximately 43 oz. is good for the 52-in. span at 560 sq. in. . . .

**Keeping The Lines Tight:** William Watkins handles the problem of slack lines during periods of takeoff and flight by use of a spring-loaded bellcrank. The bellcrank mounting platform usually is located between two wing ribs, with a pushrod to the elevator for up and down control. The slotted platform allows the bellcrank bolt to slide within the opening. The curved slot in the bellcrank permits a guide bolt to maintain horizontal alignment of the bellcrank in operation. This bolt also slides within the platform slot.

Also mounted to the platform is an auxiliary crank from which a pushrod is affixed to the rudder. When the model is at launching position, the spring causes the bellcrank to move toward the outboard wing, thus activating the auxiliary crank and creating offset in the rudder. As the model reaches maximum speed, thus creating centrifugal force increase, the model moves away from the pilot, extending the spring and allowing the rudder to return to a near neutral position. An alternate position of the auxiliary crank

Why not control rudder position as a function of line pull/airspeed? Watkins simply spring loads his elevator bellcrank and links the resulting motion to the rudder.



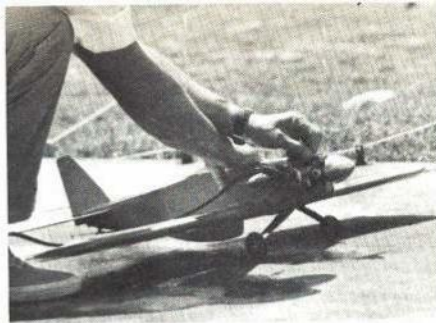
Ray Willman adjusts throttle on Class II Rossi-powered carrier model, a Guardian.

is indicated and makes reference to high-speed and slow-speed for clarity. This concept could be adapted to Navy Carrier with a few modifications. . . .

**Save Those Bottles:** Ed Jacobs, quoted in the Aero Modelers (San Jose, Calif.) Newsletter, keeps old dope bottles for other uses. To clean them, he fills the bottles with water and leaves them overnight. When the water is removed, the dope can be wiped out easily. . . .

**About That Noise:** Jim Mayfield's design indicates thought given to the acceptance of mufflers, which will be required in FAI Stunt in 1971. Various U.S. clubs now are conducting muffler studies. To review the matter, read William Netzeband's article, "Quiet Down or Quit," in the Jan/Feb. 1965 American Modeler. . . .

Reference Library: Control Line aerodynamics made painless in the following AM



Profile Mustang about to start official flight. From Sterling kit, has Veco engine.



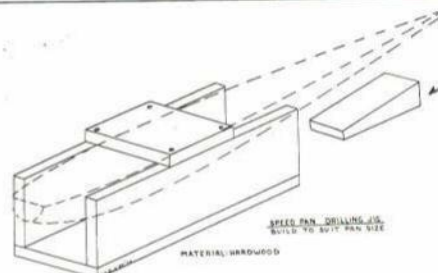
Novi built by Ed Probaska from magazine plans. Weighs 52 oz., powered by Veco 35.

issues: July/Aug. 1966; Sept./Oct. 1966; and Dec. 1967.

## C/L JOHN SMITH Specialist Correspondent SPEED and RACING

**Junior Speed Event:** For those who have a problem getting junior fliers to enter contests (and who doesn't?), here is an event that will bring them out in droves. This particular event was initiated in Cleveland and has been flown there for as long as I can remember. It was the brainstorm of Chuck Tracey, Aviation Editor of the Cleveland Press and perennial model aviation leader in that city.

The event requires a minimum number of officials. The only equipment used, other than several stopwatches and a speed chart, is a

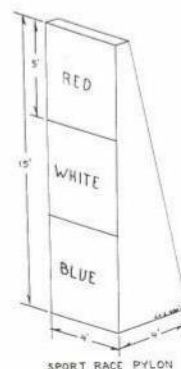


Engine mount holes in speed pans are tough to align. Try Smith's handy jig.

pylon structure, painted red, white, and blue. A painted pole could be used but the pylon adds a little class to the event.

Here are the rules: (1) Any kind of model may be entered, including plastic RTF's, but no speed models. (2) Highest score from one flight is winner. (3) Select any one of three color zones before takeoff and advise judges. (4) When ready, signal for timers to start timing. (5) Hold model at required altitude (color zone) for required number of laps. (6) The number of laps is determined by (Continued on page 66)

Add fun and a challenge to racing events with this colorful pylon. Text tells how.





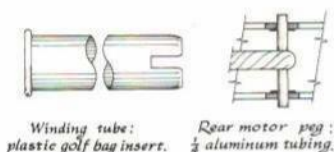


Marty Thompson won Design Craftmanship award at Boeing contest with this Nordic.

## F/F BOB MEUSER

General Correspondent  
SPORT

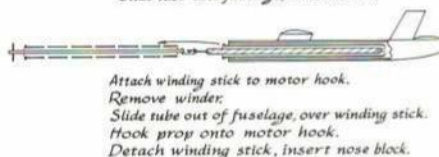
Big Boeing Bash: Fifteen-year-old Richard Sironen of Seattle won the \$1500 college



Winding tube: plastic golf bag insert. Rear motor peg: 1/2 aluminum tubing.



Slide tube into fuselage, wind motor.



Attach winding stick to motor hook. Remove winder. Slide tube out of fuselage, over winding stick. Hook prop onto motor hook. Detach winding stick, insert nose block.



Prop hook. Motor hooks.

Meuser suggests plastic golf bag insert as fuselage protector for rubber jobs.

A clear demonstration (in Meuser's model) of what happens when the rubber explodes.



scholarship award as grand prize in the Boeing Management Association contest held near Seattle on June 20-21. He took first place in Towline Glider, Cargo, and Indoor Hand Launched Glider, second in Outdoor Hand Launched Glider, third in Indoor Easy B. Bill Fisher, a CL man from Tacoma, and free-flighter Marty Thompson of Livermore, Calif., were close on his heels. The meet included RC and Rocket events in addition to FF, Indoor, and CL, and also a special award for Design Craftmanship. Flying facilities were excellent, weather superb. Fifty-nine contestants, aged nine to eighteen, came from six states and Canada to participate in the 17 events. Contestants said it was an especially well-organized and well-run meet. Boeing was delighted, plans a repeat in 1971. . . .

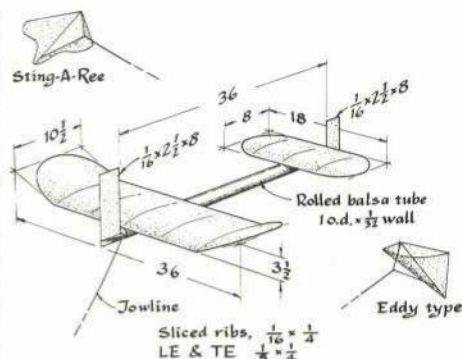
**Blast-Proof Rubber-Powered Models:** Enough energy is stored in the rubber motor of a big Unlimited Rubber model to lift an automobile three inches. When that motor explodes during winding, as it surely will sometime, weeks of effort are destroyed, along with a possible trophy or national record. Bob Stalick (AAM, June 1970, page 38) showed how the motor can be inserted into the fuselage after the motor is wound. A variation on this theme (see drawing) employs a winding-tube inserted into the fuselage during winding. This system saved Andy Faykun's Unlim at a recent meet, and George Xenakis uses a similar arrangement with his Wakefields. The plastic tubes used in golf bags, available at sporting goods stores, are 1 1/4 in. diam., 34 in. long, and are ideal for large models. A cardboard tube taped liberally with electrical tape is fine for smaller models. The prop must be detachable from the front motor hook, and the hook must have a place for the winding stick to hold it while it is being transferred from winder to prop. Sounds complicated? Not really, and much less so than building a new fuselage! . . .

Kites are Free-Flight? What is a towline glider on tow if it isn't a kite? Mostly-indoor-builder Bill Bigge builds kites that are a cross between indoor microfilm model and an outdoor rubber-powered job. Much can be learned about free-flight from kite flying, and Bill has demonstrated that being a free-flighter puts him one-up on the traditional kite fliers. Bill won the Best Kite Award at the Smithsonian Institution's annual Kite Carnival in 1967, 1968, and 1969, and this year won an award for Best Airplane-Type Kite.

Originator of the Carnivals was Paul Garber, recently retired from a lifetime with the Smithsonian aviation museum. Paul developed camera-toting kites for the Army in World War II, and some oldsters will remember his book, *Building and Flying Model Aircraft* of 1928 at about the end of the twin-pusher era.

The Washington, D.C., area is a hotbed of kite-flying activity, with contests sponsored by the Maryland Kite Society, the National Park Service, a group at the University of Maryland, and the D.C. Maxcutters, in addition to the Smithsonian. Someone must have reasoned that if kite flying is so darned much fun there must be a law against it. Sure enough, they dug back 80 years and found one, and for a time the police were actually busting people for the criminal and vile act of kite flying!

Bigge's latest endeavor features light-weight indoor-model-type construction and a forward fin—conductive to stability, as pointed out in J. K. Querman's article in the 1957-58 *Model Aeronautic Yearbook* (Frank Zaic, Model Aeronautic Publications). Its predecessor was a similar tandem-wing affair which began life as an Outdoor Unlimited Rubber class model but which, according to Bill, "was much happier as a kite."



The Cleaver, championship kite by Bill Bigge

For very light kites, Bill uses nylon thread unraveled from model-covering cloth—about 5-oz. strength, wound on a 2-in. spool attached to a 16-to-1 gear ratio rubber winder—reels them in fast. One of Bill's kites of the conventional crossed-stick or Eddy type has wires at the center of the horizontal stick which permit the sides to fold back harmlessly when the wind becomes too strong, or when reeling in rapidly.

Flying scale kites are an intriguing idea. A free-wheeling prop could act as a forward fin to provide the required stability. Bill tells about flying kites into thermals! It seems a fellow could learn much about thermals—size, strength, etc. — by towing a kite back and forth through them. If the flying-kite problem continues to intensify, maybe we'll be forced to adopt kites. Bill says one of the best store-bought kites is the one-dollar Sting-A-Ree by Gayla Industries.

Bill really wasn't up to par at his most recent kite contest — seems he was up late the night before finishing his model dirigible! . . .

**Meet Canceled Because Of — Sheep Ticks?** We have heard of meets being canceled because of rain, snow, wind, and war, but sheep ticks is a new one. Ocie Randall says that, since several of their members had lost a week's work and one was hospitalized for three days after being bitten by the wee beasties, the Fresno Gas Model Club has ceased holding meets in April — no problem in March or May. That this is no small matter is emphasized by what the Fresno group will put up with without canceling a meet. At their June meet the wind was so strong that more than half of the entries were lost with three-minute maxes. Most were later found by airplane search. W. F. Morgan's model was wrecked around by the wind, and the prop of his Tiger 15 chopped up his hand so severely that stitches were required. Then, after the meet, the headquarters trailer was literally blown off the road while being towed home and totally destroyed, along with stop-watches, PA system, and records. Oh well, everybody has their little problems.

## F/F BOB STALICK

Specialist Correspondent  
GLIDER and RUBBER

Community Model Airplane Program: The lifeblood of this hobby is based not only on continued participation by old hands, but also on the developing of new modelers





Twins Reid and Roger Simpson, members of U.S. Air Force Team, seen at '63 Nats.

to share in the wonders of flight. So many of the technicalities taken for granted by experienced fliers are completely bewildering to a newcomer. Older beginners can turn to a number of sources for information, but the young ones are left pretty much in the dark unless a modeling dad or neighbor is willing to spend hours explaining the intricacies.

Working with rank beginners in the small-fry category is a trying and time-consuming, but rewarding, endeavor. Those who have tried a model building and flying program for youngsters know what I mean. Until

Frank Ehling developed the AMA Racer/AMA Sig Cub, building a truly flying model too often was beyond the ability of the beginner. Now, based on the AMA Sig Cub, the AMA has published a booklet, "A Community Model Airplane Program," which details methods for establishing a program for young beginners.

For the past two years, members of the Willamette Modelers Club, Inc., have sponsored such a program at the local Boys' Club. A long-term project which lasted 20 weeks, it attracted and introduced about 60 youngsters to the wonderful world of model airplanes. The program went on, in 1969, to prepare members for competition in the AMA-HIAA-Navy Air Youth Program. This year the Willamette Club hosted its own meet, open to anyone under 16.

Much was learned by applying basic aeromodeling experience to basic aircraft.

Jack McGillivray of Canada winds while John Foley strains to hold the model.



and by planning a program well in advance to prevent anticipated difficulties. Club members also learned some important things about working with groups of youngsters. For a successful program, the following suggestions are invaluable:

(1) If the program goes beyond the Sig Cub phase, and it should, have a limited number of modelers for each instructor. Six or eight boys asking questions and wanting help for an hour and a half is about the limit of human endurance.

(2) Schedule meetings regularly and at the same location each week.

(3) Provide for some type of competition after each phase of construction. For example, when the Sig Cub is finished, hold an informal contest to teach adjustment and other flying techniques pertinent at this level.

(4) Have some long-term goals, such as the AMA-HIAA-Navy Program was in 1969, to culminate the year's activities.

(5) Enroll only youngsters who can display at least basic reading skills. We also stipulate that boys be eight years old, but prefer them a year or two older. Requiring a small investment of 50 cents or a dollar by the youngster helps ensure his taking care of the equipment and supplies.

(6) Require that all building for the program take place at the meeting site. However, encourage youngsters to try constructing other models on their own. Suggest some that are equal to their current building level.

(7) Have a beginners' ten week session and then an advanced section for those who successfully complete the beginners' phase.

Next month, a week-by-week outline for setting up such a program will be given.

## F/F BUD TENNY Specialist Correspondent INDOOR

New York Club Checks In: The Pan American Model Aero Club has 26 active members, all employees of Pan American Airways. The club meets monthly and is adding indoor flying to their regular CL and RC activity. The emphasis is heavy on Indoor Scale, because of drafty conditions in the hangars where they fly. However, the club co-sponsors two indoor meets annually, at locations where flying conditions permit other events. For more club information, write Dan Wansor, 514 Beach 45 St., Far Rockaway, N.Y. 11691...

Light indoor model joints use the least glue but must have perfect joints as shown.

Balsa Wood Joints: A recurring question about indoor models is how to make strong, light joints in balsa wood. Two basic principles are involved: proper fit between the pieces and proper choice of glue. Proper fit means that the two pieces of wood must touch all along the joint, with no open spaces left to fill up with glue (see sketch). Glue which fills the cracks adds weight out of proportion to the added strength.

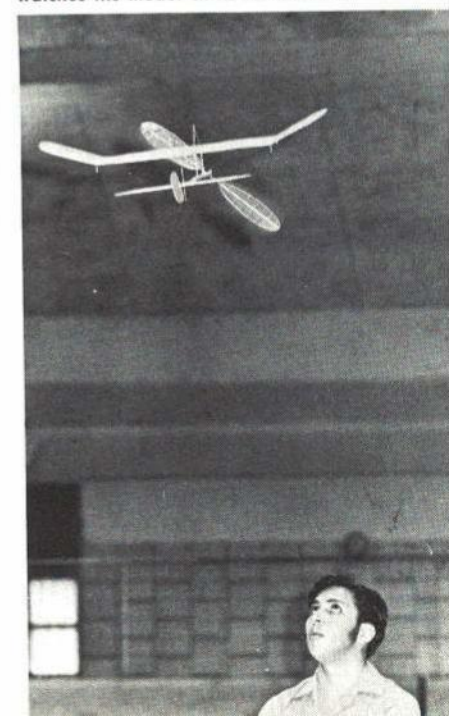
Almost any commercial model or household cement (except special plastic cements) is good for balsa; however, it must be slow-drying. Joints in wood get their strength from glue which soaks deep into the fibers and holds them all together. Fast-drying glue hardens without penetrating, thus only the top surface of the wood is involved in the joint.

For ultralight indoor models, so little glue is needed that it is made very thin and applied with a hypodermic needle to control the amount applied. Use dope thinner with

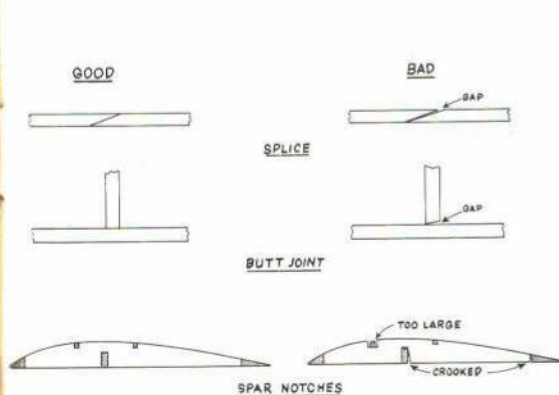
a little amyl acetate added to thin out the glue; then experiment with scraps of balsa to get the right mixture for proper drying speed. The same material can be used on heavier models. A small, pointed brush is used to apply the glue. Coat the parts before joining, set them in place and let the first coat dry. Add several more coats of the thin glue. This makes stronger joints with less weight.

Let's have more club information. Write Bud Tenny, Box 545, Richardson, Tex. 75080

Dan Domina, a strong Paper Stick competitor, watches his model climb for altitude.



Sketch by Pat Percival shows proper wire bracing on indoor microfilm "filmsie."





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into what you make,



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MODEL SPECIFICATIONS:

.09 TO .15 ENGINE, 40 INCH WING SPAN, 320 SQUARE  
INCH WING AREA, MEETS 1/4 MIDGET RACING SPECIFICATIONS.

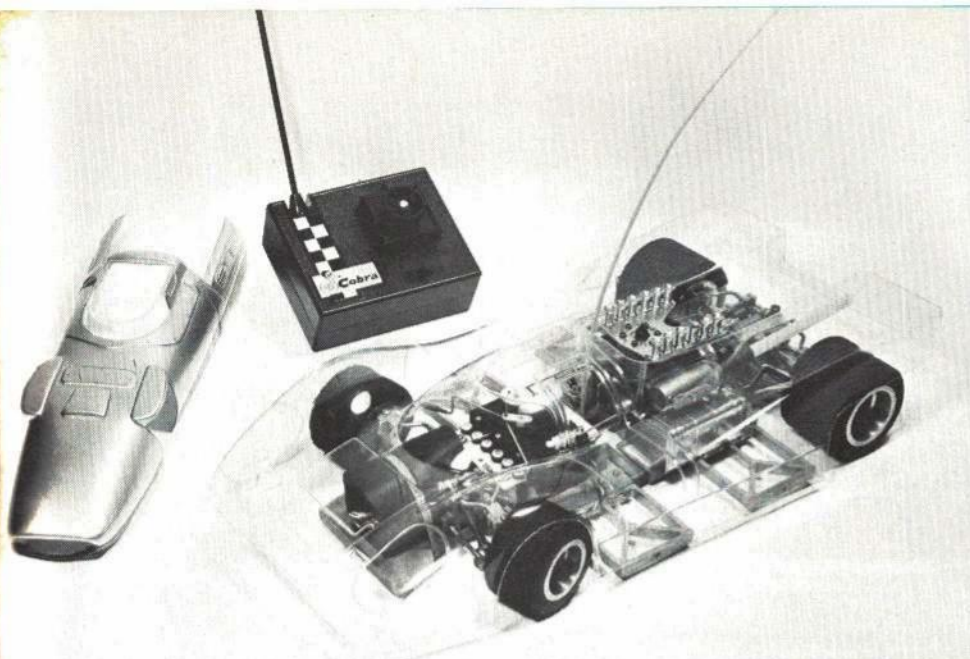
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## Orbit "Cobra" with Dynamic Porsche 917

GEORGE SIPOSS

BACK IN THE EARLY DAYS of radio control, Orbit Electronics, with Bob Dunham at the helm, was one of the pioneers. Reed or digital proportional, those black transmitters could be found in the hands of many early RC pilots.

In response to the terrific upsurge in RC car activity Orbit again has pioneered, this time with a set designed specially for cars and with features that reflect an in-depth understanding of human engineering. It is aptly called the Cobra. (Remember the world-beater Cobra-Shelby race cars a few years

ago?) Its concept was influenced by the MATS and Toledo shows, where the number of cars convinced even skeptics that a new era in racing has arrived.

Our Cobra was one of the early production models, complete in every respect but not supplied in a fancy box. It was installed in a Dynamic 1/8 scale car, the battery fully charged overnight, and then tested on one of Southern California's popular tracks. The system's frequency was 27.045 (red). This is of no real consequence because the set comes with a set of four spare

crystals, and the transmitting frequency can be changed by simply unplugging and replacing the crystals. Thus, during a typical race, a car can be assured of a spot in the starting lineup instead of being "married" to a frequency. A full set of flags is available, so that the set can be completely changed over and complying with regulations in a matter of seconds.

Our transmitter is black with a checkered design and has no unnecessary embellishments. This no-nonsense design is meant to take abuse during a hard-fought race day. The transmitter has no meter, and the on-off switch is out of the way where it cannot be tripped accidentally. The three-spoke design steering wheel is much easier for beginners to learn to use. The wheel allows more feel and resolution than a gimbaled stick. Steering trim is electromechanical and is in an easy-to-reach location above the wheel.

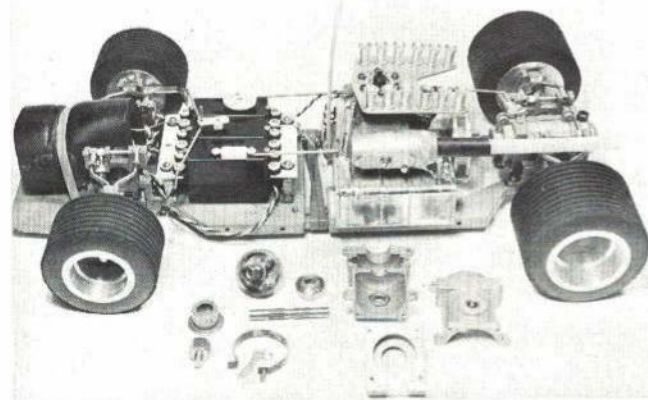
The left hand holds (actually cradles) the transmitter and, thus, the left index finger finds the spring-loaded throttle lever very easily. Below the throttle is another lever, used for cars which have a shiftable gearbox or torque converter. The center position of this lever has a spring detent to locate neutral.

Located in a slanted position on the upper edge of the transmitter, the antenna is automatically in a vertical position when the transmitter is held most conveniently. This assures maximum power output and is not a hazard to nearby drivers who stand elbow to elbow while racing.

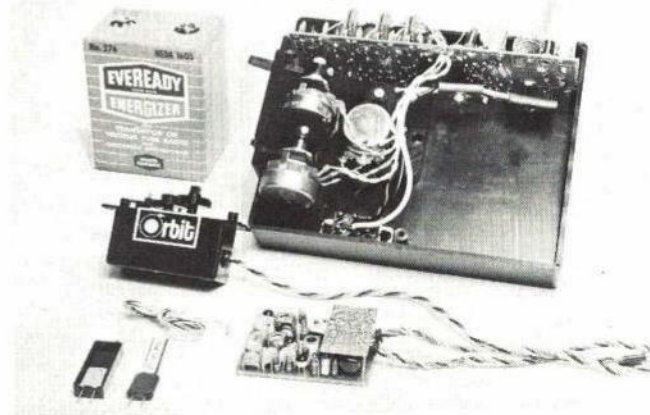
The layout inside the transmitter is uncluttered, the PC board sits neatly

(Continued on page 76)

Torque converter has effect of infinitely variable gear ratios from infinity (which is out of gear) to 6.6 to 1, fully engaged. De-clutching in a spin takes practice; you must be quick. Drag race starts are nifty; one can lay a strip of rubber spinning the tires. Ackerman steering system is fully adjustable.



In addition to all-plastic transmitter, two most significant features of this radio are interchangeable crystals shown at left—an essential feature for serious racing. Another feature is super-fast PS-5 servo with very thick gears, as shown. Incidentally, while NiCads are used with receiver, the dry transmitter battery seemingly lasts forever.







An RAF Boston III in Egypt in 1943. Photo fortunately reveals the twin swivel-mounted guns in rear cockpit, gun pod on side of nose.



Douglas A-20 saw widespread service  
in many roles throughout World War II

**DON BERLINER**

Photos by Howard Levy

the far more graceful solid or clear nose. The intention was to light up enemy aircraft so that they could then be shot down by single-engined fighters. Before the system was fully developed—if, indeed, it ever could have been—airborne intercept radar came into being and the bulky light was replaced by strange collections of antennas.

All the while the British were enthusiastically using the trim Douglas fighter/bomber, the U.S. was moving ahead with its plans. The first A-20A's were ordered in July 1939, and deliveries commenced in 1940. By 1941, as the war in Europe gained intensity and U.S. entry neared, orders for the machine poured in from not only the USAAF and the RAF, but also from European governments-in-exile who were fighting from British bases.

As the airplane saw more action, it was continually modified. Armament was increased, as was the bomb load. To handle the rapidly increasing weight, the original Pratt & Whitney R-1830 Twin Wasp engines of some 1100 hp. were replaced by Wright R-2600 Cyclones of 1600 hp. Early problems with directional stability were corrected by enlarging the vertical tail, thus changing its original highly tapered form to the more familiar squared-off shape.

By 1942, substantial numbers of A-20's were being sent to the USSR, some of them for the Soviet Navy's use as torpedo bombers. In all, nearly 3000 went to the airplane-hungry Russians. Most of these planes were A-20G's with heavy

MORE THAN SEVEN THOUSAND were built, yet it doesn't stand out as one of the major types in the history of military aviation. Produced as both a bomber and a fighter, it entered service before Pearl Harbor and remained operational to the end of the Second World War. Yet few, aside from those who flew the Douglas A-20 or one of its many variations, remember the type as anything more than a familiar light twin that did many jobs well, but never did anything really spectacular.

Perhaps because of its origins the Havoc or Boston, or whatever you want to call it, is something of an under-appreciated airplane. It began as the Douglas Model 7A, a company project intended to be the U.S. Army Air Corps' first twin-engined attack bomber. The original 7A never was completed, but the 7B flew for the first time late in 1938, at more than 300 mph—quite a speed for bombers in those days. It was not only fast, but it also was unusually well-armed, with eight .30-cal. machine guns in the B version and an additional four in the solid nose of the A version.

While the airplane looked highly promising to the USAAC, the first orders came from the French who contracted for 380, highly modified in light of what had been learned in the Spanish Civil War. Known as the DB-7, fewer than half of those ordered were delivered to France

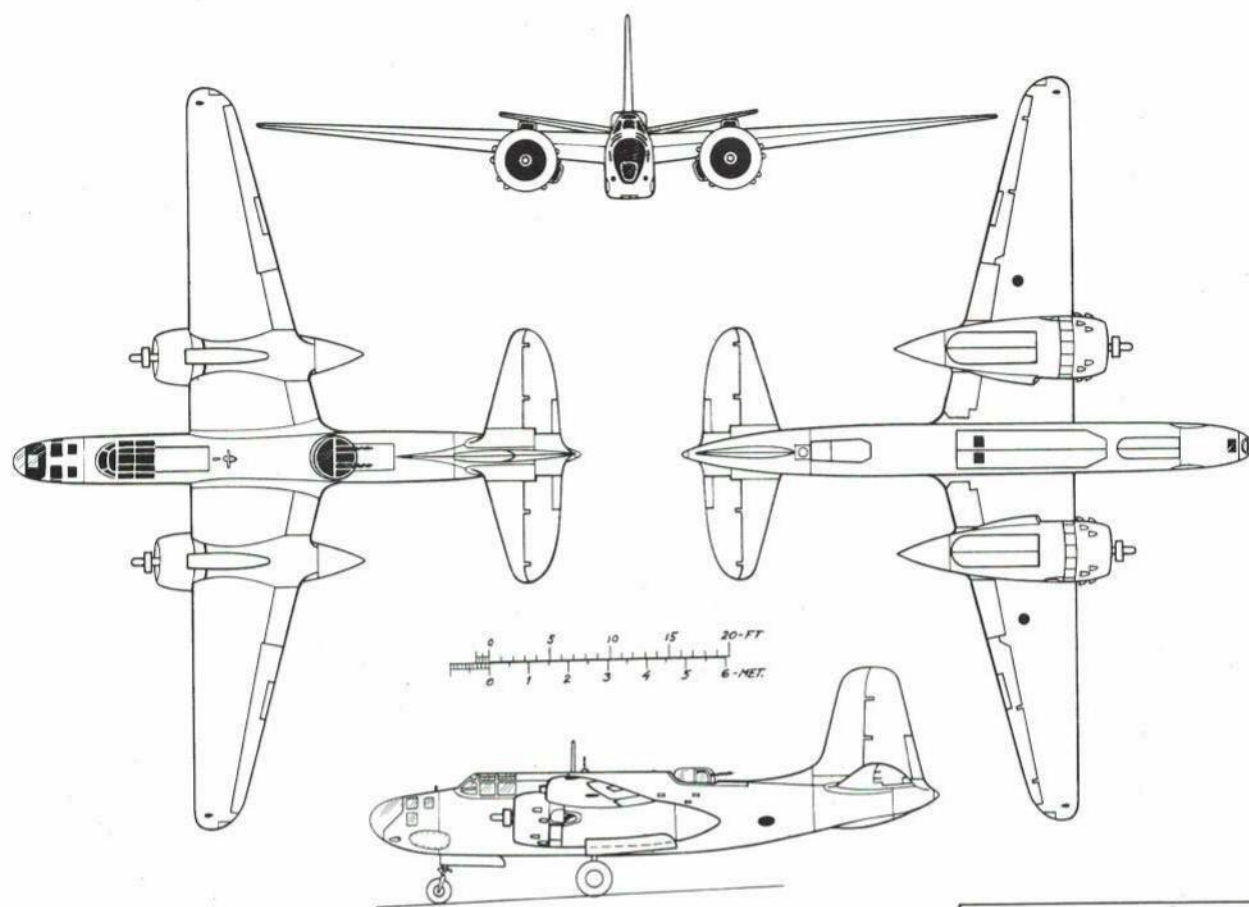
before that country fell to the Germans, and hardly any of those planes got into action. By a variety of routes, a large number of them came to the Royal Air Force, where they were pressed into service as trainers, bombers and fighters, including some of the first radar-equipped night fighters.

Because of the desperate need for night fighters to hold off the German He-111s, Ju-88s and Do-217s, the British tried some novel ideas, including trailing a bomb on a 2000-foot cable behind the Pandora version of the Havoc I, in hopes of dragging it into low-flying bombers. A more practical idea was the Turbinlite, a monster searchlight grafted onto the nose of a Havoc or Boston, in place of

Twin-tailed French DB-7A in early days of WW II before entry of United States. Few of these aircraft reached front before Fall of France. Many were diverted to British.







DOUGLAS A-20 K BOSTON V

batteries of guns in the nose, which made them highly effective against tanks and other hefty ground targets.

The RAF's successful use of modified bombers for night-fighting purposes did not escape the notice of the USAAF, and about 270 A-20's were converted into what was then the Army's heaviest fighter plane, the P-70. The first of these carried four 20-mm cannon in a special package under the fuselage. The P-70 was used primarily to train pilots who eventually were assigned to the North-

(Continued on page 58)

#### Dimensions

	Havoc I	P-70	A-20G-45
Wingspan	61' 4"	61' 4"	61' 4"
Length	46' 11 3/4"	47' 7"	48' 0"
Height	15' 10"	17' 7"	17' 7"
Wing Area	465 sq. ft.	465 sq. ft.	465 sq. ft.
Empty wt.	11,400 lbs.	16,030 lbs.	17,200 lbs.

#### Performance

Top speed	295 mph	329 mph	317 mph
Service ceiling	25,800'	28,250'	25,000'
Range	996 mi.	1040 mi.	1025 mi.

A-20—first production version for USAAF; Wright R-2600-7 engines; 59 converted to P-70, 1 to XF-3, 2 to YF-3.

A-20A—143 built with R-2600-3 engines.

XA-20B—1 A-20A tested with three power turrets.

A-20B—999 built with Wright R-2600-11 engines.

A-20C—948 similar to RAF Boston III, Wright R-2600-23 engines.

A-20D—never built; would have had R-2600-7 engines.

A-20E—17 A-20A modified with Wright R-2600-11 engines.

XA-20F—1 A-20A, one 37 mm cannon, two power turrets.

A-20G—2850 built with Wright R-2600-23 engines.

A-20H—412 as A-20G with 1700-hp Wright R-2600-29 engines.

A-20J—450 built as A-20G with bomber nose; 169 to RAF as Boston IV.

A-20K—413 built as A-20H with bomber nose.

BD-1—several A-20A built for U.S. Navy.

BD-2—8 A-20B built for U.S. Navy.

DB-7—original design of series, ordered by French, diverted to RAF as Boston I and II. Pratt & Whitney R-1830 Twin Wasp engines.

DB-7A—100 for France became RAF Havoc II. Wright R-2600 engines.

DB-7B—300 for RAF as Boston III.

DB-7C—48 similar to Boston III for Dutch AF in exile.

DB-131—1 DB-7 tested by France with twin rudders.

XF-3—photo version of A-20.

YF-3—2 A-20 converted to photo recon.

F-3A—46 A-20J and A-20K converted to photo recon.

O-53—1489 photo recon versions of A-20B cancelled.

XP-70—A-20 modified to fighter with four 20 mm cannon in nose.

P-70—59 A-20 modified as fighters.

P-70A-1—39 A-20C modified as fighters.

P-70A-2—65 A-20G modified as fighters.

P-70B-1—1 A-20G modified as fighter.

P-70B-2—105 A-20G and A-20J modified as fighters.

Boston I—ex-French DB-7's to RAF for training.

Boston II—ex-French DB-7's to RAF as bomber.

Boston III—300 ex-DB-7B's to RAF.

Boston III Turbinlite—three Boston III with 2.7 billion candlepower light in nose.

Boston IIIA—Boston III built by Boeing for RAF.

Boston IV—169 A-20J for RAF.

Boston V—90 A-20K for RAF.

Havoc I—ex-French DB-7's to RAF as fighter.

Havoc I Turbinlite—31 Havoc I, 2.7 billion candlepower light.

Havoc II—ex-French DB-7A's to RAF.

Havoc II Turbinlite—39 Havoc II modified with light in nose.

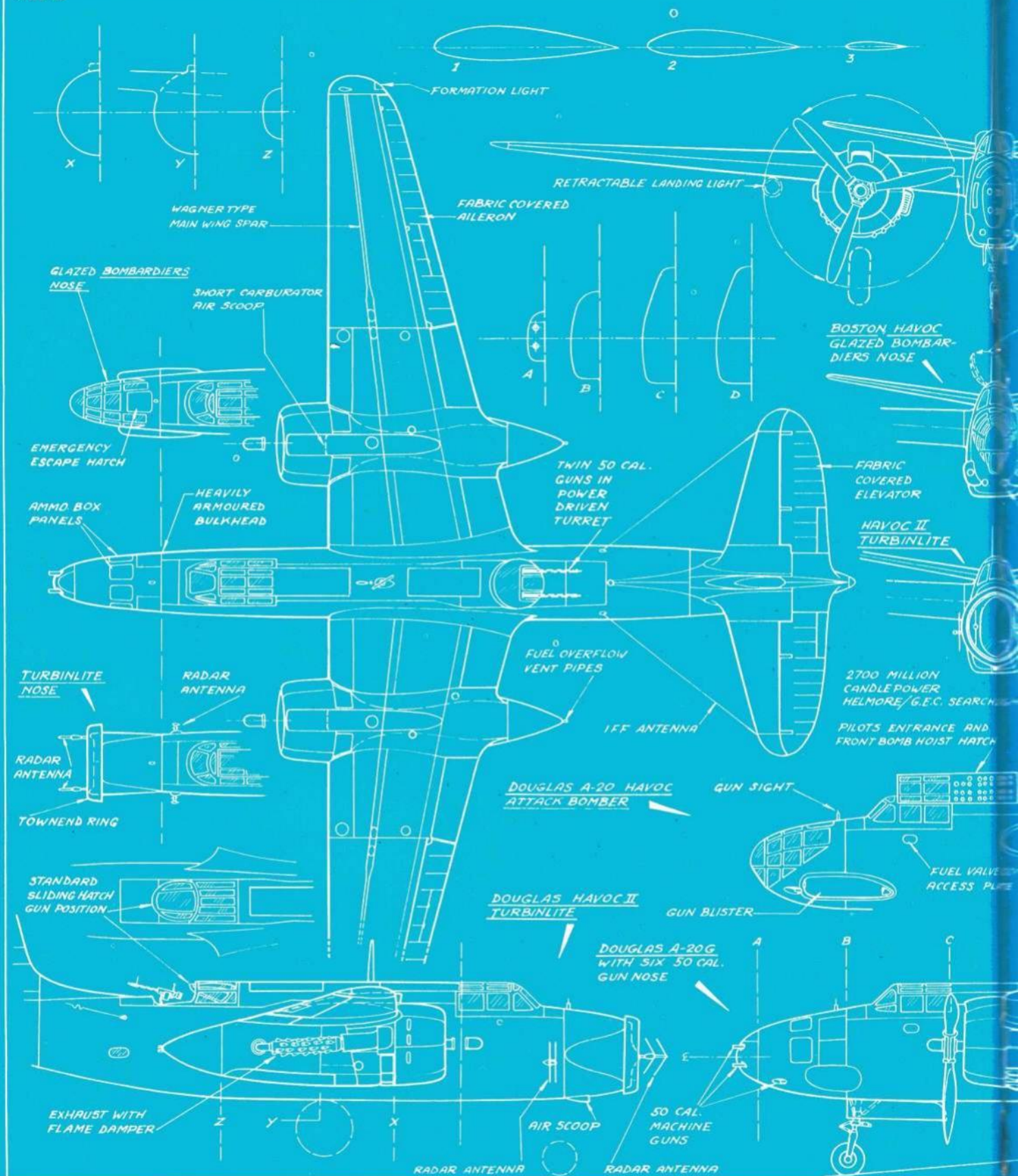
Havoc III—became Havoc I "Pandora" version; 20 modified.

Havoc IV—became Havoc I (Intruder).

Douglas 7A—prototype, fighter nose, P&W R-1830 engines.

Douglas 7B—prototype, bomber nose, P&W R-1830 engines.





# Douglas BOSTON/HAVOC





Over 7000 of the Douglas A-20 were built for the RAF, USAF, and many governments in exile who were fighting from bases in England. Armaments, details, and

missions varied in seemingly endless combinations. When, in 1944, production halted, the A-26 (a larger, faster brother) began rolling from the Douglas line.

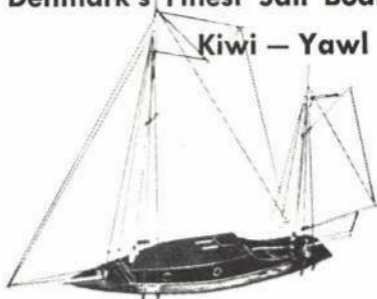


# Some New Billing Boat Kits From Kayeff

## All With Planked Hulls

### Denmark's Finest Sail Boats

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Excellent quality construction kit, 22½" long by 19½" high. Includes ribs, planking, Brass fittings, cloth for sails. Complete kit, including fittings — \$11.00.



**VIKING SHIP KIT, Complete.** This exciting new kit by Denmark's Finest Models features planked hardwood hull, and is an authentic reproduction, scaled down to 26" long by 6½" wide. — \$16.00

**SPERWER** — Model of Dutch Canal Boat, in scale of 1:15. Length 23½", Width 9", height 32". Kit comes complete with sails and decorative side paddle. Complete with fittings of brass — \$33.00.



**DRAGON** International Racing Class. 31" long. Complete with fittings — \$29.00.

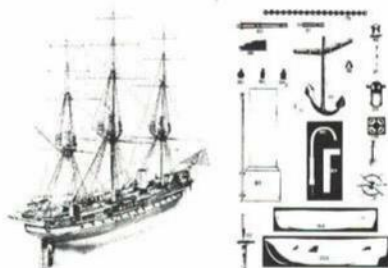
#### "Pirate" Racing Yacht

Approx. 24½" long, 33" overall height. Mast 27" high. Excellent quality wood construction kit including keel plate, ribs, and planking. Detailed instructions and plans.

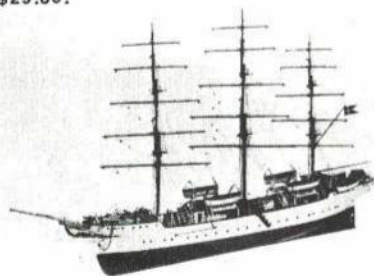
Complete with sails metal keel, and fittings. \$10.00



**BLUENOSE.** 35" long, 27" high. Beam 5½" with all fittings — \$52.00



**JYLLAND Frigate.** 39¾" long, 24¾" high. Complete with fittings — \$65.00.



**DANMARK** Training Ship. 35½" long, 23½" high, 5½" beam. With fittings — \$75.00



**WASA** Warship from 1628, 23" long; 23" high. Complete with fittings — \$41.00.

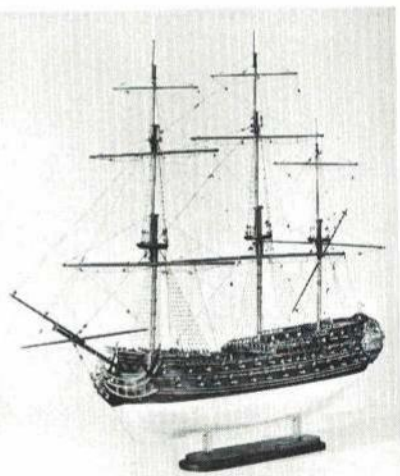
FITTINGS NR 432  
SANTA MARIA



**SANTA MARIA.** 21¾" long, 17¾" high, 5" beam. With fittings — \$24.00



**LILLA DAN.** 26¾" long, 4¾" wide, 19¼" high. Complete with fittings — \$40.00



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#503 Super Constellation, 4 engine ..... \$75.00  
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S-4B Servo	30.00	22.98	18.98
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## SERVO NOTES

The S-4C replaces the S-4, S-4A, S-3 servo and works with Controaire, M.A.N., O.S. Digital Systems. The S-4B works with World Engines Blue Max Systems, Mule Digital, Digit Migit 3 Ch. and most other 4.8v center tap system decoders. The S-4D is very similar to the S-4C but is recommended for systems using SCS Decoders.

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The service experts listed in this advertisement are, for the most part, people who have been working with Digitrio and other kit systems in the various areas mentioned. They have all put together an M.A.N. System from a raw kit and have agreed to stock parts that are compatible with World Engines Systems. They have been given schematics of World Engines Systems and current OS Digital Proportional Systems. Many of these service experts service other makes of equipment other than our own. Consider these people for repair work or for help in matching up our flight packs.

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# WORLD ENGINES

INCORPORATED  
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NOVEMBER 1970

# MODEL AVIATION

Official magazine

# A.M.A. NEWS



Academy of Model Aeronautics • 806 Fifteenth Street N.W., Washington, DC 20005

INTERESTED IN JOINING A.M.A.? Over 27,000 did in 1969. Membership details may be had by requesting FREE BROCHURE from above address.

## The 1970 Nats - Bigger and Better

To the PR men involved, it was the biggest National Model Airplane Championships ever. Among contestants and officials, the consensus was that this was the best Nats ever. Producing the combination of biggest and best took some doing: good planning, innovations, excellent personnel, and a few breaks—including fine weather.

The statistics are impressive. One thousand, one hundred and forty-nine contestants, plus 395 mechanics. That compares with 1,074 contestants and 428 mechanics at Willow Grove (Pa.) in 1969 and 1,184 contestants and 217 mechanics at the previous Glenview Nats in 1966. There were 1,050 contestants entered in advance, by mail, for the 1970 Nats; 99 more registered at Glenview as late entries.

There were more events than ever before—42 this year, compared with 38 in 1969. The increase was accommodated without increasing basic Nats staff and facilities, although the workload went up for the AMA people directly involved. The event breakdown by category: Control Line—18, Free Flight—13, Radio Control—6, Indoor—5.

**Great Weather.** A short storm cut off RC Pylon qualifications about an hour early one day, but the weather otherwise did not interrupt flying—although winds during the first two days made Free Flight retrieving tough. It was always hot, sometimes windy. But on one glorious day for Free Flighters the weather was so good that, despite hundreds of flights with dozens of maxes, there were no lost models—practically all stayed on the field, and events closed early because all flights were in, including some seven and nine flight flyoffs.

**RC Scale** had two great half-days of excellent weather—a total of ten hours shared by the 28 entrants who actually flew. Many got in four flights—highly unusual for a Nats—and all could have had that many. Truly spectacular was the fact that two B-36 entries (that's twelve engines!) got in five flights between them, without mishap. Even so, RC Scale was won by a single-engined Spirit of St. Louis. It was the first Nats for builder-flyer **Ed Ellis** (Dearborn, Mich.) so the old pros took a back seat.

Single-engine entries dominated the RC Scale event, taking the top five trophies. But **Ken Drummond** (Orient, Ohio) won the Best Scale Flight Achievement award with his B-36 which dropped bombs with amazing accuracy—including one less than ten feet away from the judges!

**Ken and Walt Burgin** (Ottumwa, Iowa)  
(Continued on page 56)



Hail the champions! Bucky Servaites, receiving trophy from Admiral Greer, Chief of Naval Air Reserve Training, and Suzanne Bowie, Miss Model Aviation, retained his Open and Grand National Champion titles from last year and took the new FF Category award this year. Sharing in the spotlight are Marty Thompson (L) and Brian Webster, Junior and Senior National Champions.



The Delta Dart program ran for five Nats days during which over 2,000 area youngsters took part. Below left, Miss Model Aviation builds her H144 Flyer version of the DD, watched over by a Navy instructor plus H144's Walt Caddell and AMA's John Worth. Below right, during Nats, AMA's 30'000th '70 membership went to Matt Whitson—received special award from John Worth.





## NATIONAL CHAMPIONS

### Grand Champion

Bucky Servaites, Dayton, Ohio

### Junior

Marty Thompson, Livermore, Calif.

### Senior

Brian Webster, Manchester, Tenn.

### Open

Bucky Servaites, Dayton, Ohio

### Control Line Category

Danny Bartley, High Point, N.C.

### Free Flight Category

Bucky Servaites, Dayton, Ohio

### Indoor Category

James Richmond, Oak Brook, Ill.

### Radio Control Category

Larry Leonard, Northridge, Calif.

### AMA Club Team

Chicago Aeronauts (Charles Markos, Richard Lyons, James Richmond, Charles Sotich and Robert Watson)

### Nats Team

USAF Champions (Robert Adair, Keith Trostle, Hoyt Hawkins, Burt Dugan and Philip Bayle)

## PERPETUAL TROPHIES & SPECIAL AWARDS

**Tulsa Glue Dobbers** (high time regardless of age, Nordie A-2 Glider): Peter Allnutt, Toronto, Ont., Canada.  
**Mulvihill** (high time regardless of age, Unlimited Rubber): Willard Smutz, Kenosha, Wis.  
**Tulsa Glue Dobbers** (high time regardless of age, Outdoor HL Glider): Don Chancey, Richardson, Tex.  
**Hoffman Memorial** (high time regardless of age, A FF Gas): Andy DeMello, Toronto, Ont., Canada.  
**Testor's** (best model finish, regardless of age): Leroy Gunther, Allen Park, Mich.  
**Jim Walker** (winner of Junior-Senior-Open flyoff, CL Stunt): Keith Trostle, Nickerson, Kans.  
**Stout Indoor** (high time regardless of age, Indoor Cabin): James Richmond, Oak Brook, Ill.

**Stout Commercial** (high time regardless of age, Indoor Stick): James Richmond, Oak Brook, Ill.  
**Sterling Models** (best Flying Scale model of any category): Edward Ellis, Dearborn, Mich.  
**St. Louis Modeling Assn.** (most unique Scale model): Fulton H. Hungerford, Titusville, Ill.

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## NATS ENTRIES

	Jr.	Sr.	Open	Total
Number of Entrants	212	176	761	1149
Number of Mechanics				395

### Entries by Event

Control Line	Jr.	Sr.	Open	Total
Scale Racing (Goodyear)	26	22	71	119
Rat Racing	18	30	65	113
B Proto Speed	2	14	32	48
1/2 A Profile Proto	29		(Jr. only)	29
1/2 A Proto Speed	3	19	37	59
FAI Speed	3	7	20	30
1/2 A Speed	16	16	25	57
A Speed	6	13	29	48
B Speed	5	12	33	50
C Speed	5	11	28	44
Jet Speed	1	7	26	34
Stunt	22	24	47	93
Combat	34	39	84	157
FAI Team Racing	1	7	24	32
Scale	11	10	29	50
Carrier I	5	10	41	56
Carrier II	4	6	38	48
Profile Carrier	13	15	20	57
Indoor				
Scale	12	8	70	90
H.L. Glider	39	34	88	161
Paper Stick	18	11	40	69
Cabin	7	5	19	31
Stick	7	9	31	47
Free Flight				
1/2 A Gas	74	54	203	331
A Gas	41	44	188	273
B Gas	16	33	131	180
C Gas	15	28	127	170
FAI Power	7	16	83	106
Wakefield Rubber	5	7	51	63
Unlimited Rubber	27	16	84	127
Coupe D'Hiver Rubber	11	10	82	103
Nordic Glider	42	38	137	217
H.L. Glider	89	62	156	307
Rocket Power	18	20	76	114
Scale	9	9	51	69
Helicopter	0	1	7	8
Radio Control				
D Pattern	5	7	92	104
B Pattern	1	4	17	22
A Pattern	4	5	27	36
Scale	2	2	39	43
Pylon I	2	8	72	82
Pylon II	1	5	45	51



Above, camper center greatly relieved barracks shortage. Left, attendance at the Sunday Air Show was tremendous. Models and Navy's Air Barons featured.



CL Scale Racing, a new Nats event, had big entry list. Glenn Lee, left, and Ron Waldron shown with their ST 15 Pitts Special entry.



Open Stunt winner Keith Trostle exhibited in the Air Show. His original design has Focke Wulf Tu 135 looks.

## CONTROL LINE

### 1/2 A SPEED

Junior	mph
1. Brian Pardue	94.01
2. Ross Legg	90.23
3. Marty Thompson	79.40
4. Bruce Pallet	70.56

### Senior

1. Terry Herron	94.60
2. Tom Hartvigsen	92.18
3. Danny Bartley	90.33
4. Mary Brown	88.29
5. Bruce VanHoozen	86.84

### Open

1. Finn/Morton	106.72
2. Warren Kurth	105.84
3. Charles Legg	103.29
4. Anaston/Bussell/Phillip	101.54
5. Bartley/Garner	93.32

### A SPEED

Junior	mph
1. Dennis McGraw	138.83
2. Brian Pardue	126.09

### Senior

1. Mary Brown	151.20
2. Terry Herron	148.21
3. Gary McGraw	136.72
4. Danny Bartley	131.24
5. Bruce VanHoozen	129.82

### Open

1. Charles Vassallo	162.24
2. Baltes/Beatty	160.51
3. Finn/Morton	154.44
4. Alfred Stegens	151.58
5. Clifton Norman	144.40

### B SPEED

Junior	mph
No official flights	

### Senior

1. Danny Bartley	163.27
2. Gary McGraw	155.78
3. Charles Schubert	150.32
4. Brian Webster	149.69

5. Robert Myers	142.91
-----------------	--------

### Open

1. Roselle/Frye	169.42
2. Anaston/Bussell/Phillip	167.53
3. C. Fred Randall	161.52
4. Glenn Lee	159.79
5. Bartley/Garner	159.65

### C SPEED

Junior	mph
1. Michael Hainen	138.51
2. Dennis McGraw	133.97
3. Thomas E. Bell	115.86
4. Mark Pafelski	86.09

### Senior

1. Danny Bartley	186.07
2. Robert Mohr	168.00
3. Neeson/Neeson	167.84
4. Mary Brown	165.99
5. Gary McGraw	164.02

### Open

1. Roselle/Frye	189.40
2. Bartley/Garner	188.41
3. Garzon/Alpino	180.47
4. Draycott Hooke	174.35
5. Robert Heminway	173.17

### JET SPEED

Jr.-Sr.-Open	mph
1. Mike Olson	170.87
2. Seymour Olson	170.55
3. Myrle Hoyt	169.11
4. Danny Bartley	162.10
5. Baughman/Yoho	158.53

### FAI SPEED

Junior	km/hr
1. Michael Hainen	164
2. Brian Pardue	162

### Senior

1. Danny Bartley	179
2. Bruce VanHoozen	165
3. Mary Brown	160
4. Robert Mohr	141
5. Charles Schubert	136

### Open

1. Laird Jackson	214
------------------	-----



2. Carl Dodge	213
3. Clifton Norman	195
4. Keith Trostle	173
5. Finn/Morton	169

## 1/2 A PROTO SPEED

Junior—Profile		mph
1. Bruce Pallet		74.23
2. Walter Gifford		71.49
3. Brian Pardue		70.09
4. Marty Thompson		69.47
5. G. Hubschmidt, Jr.		69.39

Junior		mph
1. Ross Legg		81.97

Senior		mph
1. Danny Bartley		90.14
2. Tom Hartvigsen		89.38
3. Terry Herron		84.75
4. Bruce VanHoozen		81.42
5. John Jaycox		74.35

Open		mph
1. Bartley/Garner		95.91
2. Charles Legg		94.65
3. Warren Kurth		89.83
4. Anaston/Bussell/Phillip		88.42
5. Finn/Morton		88.16

## B PROTO SPEED

Junior		mph
1. Michael Hainen		115.04

Senior		mph
1. Danny Bartley		146.40
2. Terry Herron		139.59
3. Mary Brown		128.98
4. Charles Schubert		122.53
5. Brian Webster		111.72

Open		mph
1. Jim Delaney		148.09
2. Bartley/Garner		144.46
3. Finn/Morton		134.48
4. Draycott Hooke		124.05
5. John Camp		115.08

## AEROBATICS (STUNT)

Junior		Points
1. Mike Jackson		439
2. Alan Adamisin		371
3. Greg Voumard		361
4. David Sain		348
5. William Miller		344

Senior		Points
1. Tommy Morgan		504
2. Neal Thompson		481
3. Dennis Adamisin		476
4. Dawn Cosmillo		469
5. Michael Thompson		456

Open		Points
1. Keith Trostle		489
2. William Rabe, Jr.		475
3. William Werwage		473
4. Robert Lampione		466
5. Gene Schaffer		464

## COMBAT

Junior		Points
1. Jeff Davis		489
2. Tom Autrey		475
3. Greg Voumard		473
4. Brian McCormock		466
5. William Miller		464

Senior		Points
1. Jonathan Drake		489
2. Laurence Moore		475
3. Tommy Morgan		473
4. Neal Thompson		466
5. Richard Sherman		464

Open		Points
1. Howard Rush		489
2. Gilbert Reedy		475
3. Ronald Sheldon		473
4. Robert Baldus		466
5. Daniel Patton		464

## FAI TEAM RACE

Jr.-Sr.-Open		Time
1. Dunkin/Wright		9:48.0
2. Oesterle/Drake		11:10.7
3. Albritton/Marvin		
4. William Patton		
5. Prather/Schauer		

## RAT RACE

Junior		Time
1. Tom Tuma		6:09.3
2. Brian McCormock		6:55.8
3. Jeff Davis		7:50.9
4. Ricky Draper		10:00.0
5. Robert Ponik		

Senior		Time
1. Tim Zimmer		5:31.2
2. William Cook, Jr.		5:37.0
3. Edward Niemiec		5:49.0
4. Terry Herron		5:52.6
5. Robert Myres		6:15.9



Danny Bartley, a Senior age class entry, did some very fast Speed flying to become the Control Line Category Champion. B Proto model shown—146.40 mph Sr. first.



Ed Sensenbaugh's Carrier II Guardian in foreground is powered by a Supertigre 65 ABC engine and 8-10 prop.

Open		Time
1. S. Simpson III		5:30.5
2. Roy Gould		5:36.4
3. James Hainen		5:45.6
4. Brian Froisy		5:47.2
5. John Tulach		5:49.1

## SCALE RACING (GOODYEAR)

Junior-Senior		Time
1. Michael Hainen		8:16
2. Bill Cook		8:18
3. Stephen Wozny		8:21
4. James Holnacki		8:37
5. Alan Adamisin		9:07

Open		Time
1. John Barnhart		7:36
2. John Kilsdonk		7:37
3. Gary Pentress		7:40
4. Glenn Lee		7:41
5. John Flinn		7:59

## NAVY CARRIER PROFILE

Junior		Points
1. Mike Willmann		235.51
2. Stanley Snyder		157.83
3. Richard Dolg		128.16
4. Jay Rosenberg		117.37
5. John White		54.36

Senior		Points
1. David Engel		209.90
2. Mark Eaton		196.96
3. Anthony Carolla		173.99
4. Edwin Zivi		119.65
5. Donald Cline		72.66

Open		Points
1. Paul Smith		289.62
2. Joseph Flinn		279.06
3. James Hainen		277.85
4. James Blaszczyk		259.83
5. Frank Polowy		258.52

## NAVY CARRIER I

Junior		Points
1. Robert Sawicki		416.35
2. James Jones, Jr.		344.10
3. Dale Johnson		317.04
4. Billy O'Connor		226.07

Senior		Points
1. Douglas Tomayko		467.08
2. Michael Bedard		459.79
3. Robert Mohr		458.32
4. Bob Wright		407.93
5. Joseph Dzialo		382.15

## NAVY CARRIER II

Junior		Points
1. Robert Sawicki		423.75
2. Dale Johnson		418.98

Senior		Points
1. Douglas Tomayko		505.47
2. Michael Bedard		393.47
3. Neal Thompson		264.53
4. Joseph Dzialo		197.26

Open		Points
1. Ray Willmann		590.86
2. Donald Gerber		572.61
3. Edwin Gross, Jr.		559.73
4. Richard Sawicki		541.42
5. Raymond White		531.67

Junior		Points
1. Cathy Burnstine		253
2. Billy O'Connor		221
3. Robert Butley		195
4. William Miller		179
5. Robert Wolff		151

Senior		Points
1. John Glab		219
2. Dale Hungerford		206
3. Dirk Ouweleen		182
4. Robert Morse		179
5. James Damerell		174

Open		Points
1. Linton Keith, Jr.		495
2. E. Violet, Jr.		453
3. Bert Dugan		429
4. Frank Beatty		421
5. Bill Boss		420



Greg Voumard placed third in Junior Combat against some stiff competition. He flew a Guillotine model powered by a K & B 35, crankcase pressure, 9-7 Tornado nylon prop.



First place in Junior 1/2 A Proto Speed was taken by Ross Legg, age 14. Engine being started by his dad, Charles.



Left, Senior Stunt flight just beginning by Miss Dawn Cosmillo—original design. Right, the Roselle-Frye team maintained their superiority in C Speed, and this year they also won B. B engine is original, similar to TWA.



Lots of man-hours went into the PT19 CL Scale model of AMA VP Bill Boss. Three years in construction, it placed 5th.



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The year 1971 looks like it will be a fantastic R/O Pulse year, because we have a number of things which we'll add to our pulse line.

One item that we're working on for 1971, and on which we are ready to begin deliveries NOW, is the foam wings which are designed for small aircraft such as the Dick's Dream and the Citabria, and also other sport type airplanes such as the Skampy 2, by designer Owen Kampen, pictured above.

These are the foam wings which made a hit at the Atlanta, Oklahoma City and Toledo trade shows, and RCM said "Someone should make them available." We are—NOW!

They were developed by Owen Kampen, and Owen is well known for the flyability of his planes. The wing will work as is with the Citabria plans that we have been selling, and some slight modification is required for the Dick's Dream, but this is minor, and IF YOU REQUEST IT, we will include the modifications with your order for the constant chord wings. Both the Citabria and Dick's Dream use constant chord.

The Skampy requires the taper section. We will have more as to the availability of plans for this and other taper wing section plans later.

We think that these 35" wing sections (see details elsewhere) represent an important break through for the modeller. They will provide aircraft which is designed to fit beautifully with our Commander R/O Pulse Systems in the Baby and Baby Twin sizes.

These wings have undergone development and testing for well over two years. The airfoil as used is especially designed for small aircraft by Owen Kampen, and the foam provides great flexibility with high strength, and has a bead which provides exceptionally light weight at the same time.

Join in the fun!

Keep 'em pulsing,  
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Paul F. Runge  
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No. 12K2—Commander DE Gem Rx \$31.50  
No. 12K3—Commander SEB Gem Rx 30.75

(For the Bentert only)  
(Available all 27 MHz except 27.255.)

### COMMANDER R/O TRANSMITTER

The foregoing receivers are compatible with our Commander Pulse Transmitters. Requires 9 volt battery of the M1603 type.

No. 11K1—Commander R/O Tx \$42.50  
(Available all 27 MHz except 27.255.)

### BENTERT ACTUATORS

These are single coil units with magnetic return. Small model weighs 7.5 grams and draws 50 ma at 3 volts. Large model weighs 15 grams and draws 80 ma at 3 volts.

No. 14K1—Small Bentert Actuator \$9.95  
No. 14K2—Large Bentert Actuator 9.95

### MALLORY MS76 SILVER OXIDE

Non-rechargeable 1 1/2V. Good for 60-90 minutes with Gem and Bentert. Only 2.2 grams; .46 x .21".  
No. 38K32—MS76 Silver Oxide cell, ea. \$5.0

### 50 MA BUTTON NICAD

Rechargeable 1.25V. Only 3 grams; .606 x .230". Solder tabs.  
No. 38L4—Nicad B50T Button/tabs, ea. \$1.39

### 100 MA BUTTON NICAD

Rechargeable 1.25V. Only 8.5 grams; .63/.64 x 1/4". Solder tabs.  
No. 38K29—Nicad B100T/tabs, ea. \$1.70

### 2.4V/B100T PACK

Two of above 100 ma cells stacked for 2.4V pack with tabs. Measure .63/.64 x 1/2".  
No. 38K9—2.4V/B100T Pack \$3.65



# PULSE .. Best Choice for You!

FULLY PROPORTIONAL-BUILT-IN RAND STICK WITH TRIM; ALL BATTERIES SUPPLIED, NICKEL CAD PAK FOR AIRBORNE UNIT; THOUSANDS IN USE

## RUDDER ONLY PULSE IS:

- \* FULLY PROPORTIONAL!
- \* LIGHTEST--2.5 oz. for Baby
- \* LOWEST COST--Packages include ALL batteries; Airborne cost pack uses nickel cads for re-peatability and dependability; need only re-charging.
- \* SIMPLEST--only one moving part, noise free
- \* VERSATILE--arrange to suit your particular installation. You can go up in size or down in size. You can even go micro and mini, and not obsolete your transmitter or basic receiver. Simple changes of battery and actuator allow a variety of installations. Motor control can be easily added to larger units.
- \* EASY to install
- \* GREAT for Beginners--CHALLENGING to the pros.
- \* FUN!

## WITH ALL BATTERIES!



## COMMANDER R/O PULSE PACKAGES Ideal for Beginners and Sport Flyers Now available in four sizes!

The Commander R/O packages contain the Commander DE 2.4 superhet receiver, Commander Pulse Transmitter, Adams actuator size of your choice, and nickel cads, wired with on-off switch, AND each package saves you \$10.00 over buying components separately.

The R/O Packages are available in 4 sizes for most sporting needs from the smallest to the larger aircraft--or boats. Ready for installation, completely wired and tested.

The Baby is for .010 to .020 jobs. Has two 225 ma Nickel Cadmiums and the regular Baby Adams. Airborne weight is 2.5 oz.

The Twin Baby is for hot .010 to .020 jobs. As above, except uses Twin Baby actuator. Airborne weight is 2.9 ounces.

The Standard uses the Single Adams for more power for .049 to .07 size. Uses larger capacity nickel cads. Airborne weight is 4.5 oz.

The Stomper uses the Twin Adams actuator for up to .15, or can be boosted for use with .19. Airborne weight is 4.9 oz.

(Charging equipment extra)

No. 10G15--Commander R/O Baby pkg. \$69.95  
No. 10G15T--Commander R/O Twin Baby \$72.95  
No. 10G16--Commander R/O Standard 71.95  
No. 10G17--Commander R/O Stomper 74.95  
Available all 27 MHz, except 27.255. Specify.

Thousands of Satisfied Users

## ACE FOAM WINGS

Here are the 35" span foam wings that were the hit of the Atlanta, Oklahoma City, and Toledo trade shows. They are available in two configurations--constant and tapered. The airfoil is especially designed for small aircraft, and is semi-symmetrical.

They were developed by Owen Kampen, working in conjunction with the late Dick Adams.

The constant chord measures 35" span, and is 5 1/2" wide for an area of 192.5 square inches. Weight is about 3 ounces.

The tapered section is 35" span, center is 5 1/2", which tapers to 4", and has a total of 166.25 square inches. Weight is just over 2 oz.

Wings come in two pieces of 17 1/2" so that they may be easily epoxied for the correct dihedral. May be used unfinished or finished with a polyurethane varnish; or striped with Monokote for trim.

The constant chord section may be used with the Dick's Dream with slight modifications on the fuselage (we have poop for these mods, but you MUST REQUEST it). Citabria works by adding 1/2" balsa strip. Taper section may be used with design to be published later.

Also lend themselves excellently for the home-brew builder who wants a proven and tried airfoil which will provide satisfaction and service.

Build small--with foam; a real breakthrough! Makes planes which are ideal for the Cox Pee Wee or TD .020 engines and the Commander Baby or Baby Twin R/O packages.

No. 13L166--Ace Foam Taper Wing \$2.95  
No. 13L192--Ace Foam Constant Wing 2.95

## COMMANDER CHARGERS

No. 34K4--Commander Baby Charger \$4.95  
No. 34K5--Commander Std.-Stomper Chg. 4.95

## NICKEL CAD TX BATTERY PACK KIT

If you are a regular flyer of your Commander system, you have found that the transmitter battery does go down fairly fast. This is because this is a powerful transmitter. If you want to avoid the continuing expense and also assure yourself with a reliability and dependability on your transmitter that you have on your receiver pack, go nickel cad.

We have a completely assembled battery which measures 1 3/8" diameter by 2 11/16" long. Has lugs for easy attachment of wires. Made up of seven 500 MAH nickel cadmium type batteries. 8.75 volts. Will easily fit the Commander series of transmitters. Comes complete with charging jack and mounting hardware in kit. Check dimensions of your case for use in other transmitters.

No. 38H74--XL-ent K9V Transmitter \$10.00  
Nickel Cad. Battery Supply Kit

(If you order this at the same time as your Commander Pack, we will install. Request installation on your order, and it will be done without charge.)

## NEW HANDBOOK-CATALOG For the Fun Flyer and Tinkerer

Our NEW Handbook-Catalog is bigger and better than ever. We specialize in equipment for the Beginner, Sunday and Fun Flyer. More items for the do-it-yourselfer, more products from most major manufacturers, in addition to many Ace exclusives. Greatly enlarged HANDBOOK section. Last year this was called "Bible for R/C." "A MUST" by R/C editors. Price is just \$1.00 POSTPAID. This is completely refundable on your first order! And that order also puts you on our mailing list for our newsletters and R/C Data Service--acclaimed the world over. You can't lose--send your buck on a round trip today. It could be the best dollar you ever spent!

Important: For overseas delivery on catalog or Binder please add \$5.00 for additional postage.

My BankAmericard #



## PLANES JUST FOR FUN!

Easy to build, easy to maintain, and low in cost and upkeep, this new breed is fine for beginners. AND more and more of the big plane fliers are joining in on the fun so they can keep their hands in--or teach their youngsters.

To help the Fun Plane along, Ace is offering two plans now. More later. These are full size with enough details to allow almost anyone with just a bit of experience to build and fly. They are designed specifically for radio gear of no more than 3 ounces--and here is where the new Commander R/O Baby Twin pack comes in. Just right and proven dependability!

Rudder-Only does allow you much more than simple steering--you can do loops, spirals, Split S, and many more. You can gain or lose altitude simply by widening or tightening your turn.

## DICK'S DREAM

This 34" job is designed by Owen Kampen. Named for the late Dick Adams who developed the magnetic actuators. Essentially this is a scaled down Whiz Kid, but has a few features especially for this size plane. Easy construction. Plans are full size.

No. 13K29--Dick's Dream Plans \$1.00

## CITABRIA

This semi scale is a design by Roman Bukolt. Has 34" span and features simple slab construction. Another eye catcher at the Toledo Conference. Full size.

No. 13K30--Citabria Plans \$1.00

## COMMANDER GALLOPING GHOST

Rudder, Elevator, Motor--One Actuator  
No. 10G18--Commander Ghost \$109.00

## COMMANDER FAST PULSE PACK

Rudder, Elevator, Motor--Two Actuators  
No. 10G19--Commander FP \$139.00

All 27 MHz frequencies, except 27.225.

ACE RADIO CONTROL • BOX 301 • HIGGINSVILLE, MO. 64037

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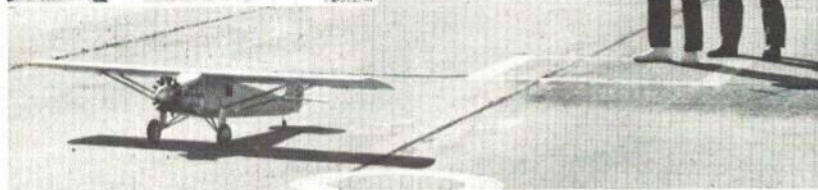
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QUANTITY	STOCK #	NAME OF ITEM	PRICE	TOTAL

Guaranteed delivery anywhere. Orders over \$5.00 sent prepaid. Orders under \$5.00 please add \$5.00 for postage and packing.

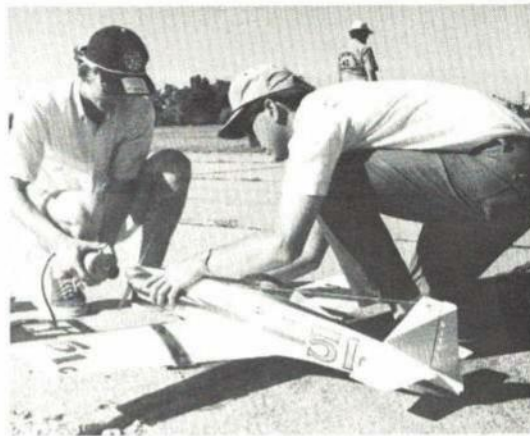




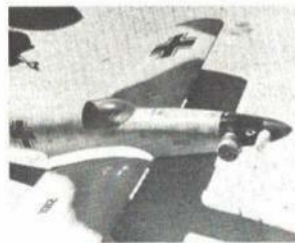
Ed Ellis' Spirit of St. Louis is modeled after the aircraft residing in the Henry Ford Museum. It won RC Scale first and also the Sterling Models Award. Wingspan is 80 1/2".



The winning D Pattern model by Jim Kirkland is an original design with appearance similar to the Navy's A-6 Intruder. Lee Custom engine, KDH retracts, Pro Line.



In Formula I Pylon, a flyoff between Al Sager and the Bertken/Smith team (shown) was necessary to decide the winner. The B/S team finished barely ahead of Sager.



Left, Jim Edwards flew Dragon Fli model to D Pattern 2nd. Pro Line radio, KDH retracts. Right, B Pattern model of Denver entrant James Wilmot had too much lift—used soda straw spoilers.



Ken Drummond won Flight Achievement Award with RC Scale B-36. Note wing tip assembly, important in transporting 115" span.

## RADIO CONTROL

### D PATTERN QUALIFYING

Jr.-Sr.-Open	Points
1. Jim Kirkland	8685
2. James Whitley	8520
3. Ron Chidgey	8435
4. James Oddino	8350
5. Larry Leonard	8340
6. Phillip Kraft	8335
7. James Martin	8335
8. James Edwards	8295
9. Don Coleman	8260
10. Tony Bonetti	8260
11. Bob Smith	8225
12. Norman Page	7990
13. William Salkowski	7910
14. Douglas Spreng	7795
15. Donald Lowe	7785
16. Cliff Weirick	7780
17. John Dougherty, Jr.	7695
18. George Hill	7670
19. Robert Noll	7645
20. Alan Dupler	7585
<b>Best Junior</b>	
Billy Hiller	
<b>Best Senior</b>	
Bob Smith	

### D PATTERN FINALS

Jr.-Sr.-Open	Points
1. Jim Kirkland	14140
2. James Edwards	14045
3. Phillip Kraft	14025
4. James Whitley	14000
5. Larry Leonard	13890
6. Don Coleman	13735
7. Ron Chidgey	13665
8. Norman Page	13555
9. James Martin	13480
10. Tony Bonetti	13440
11. Donald Lowe	13320
12. James Oddino	13305
13. William Salkowski	13185
14. Douglas Spreng	12860
15. Bob Smith	12855
16. Cliff Weirick	12760
17. George Hill	12480
18. Alan Dupler	12160
19. J. Dougherty, Jr.	11805
20. Robert Noll	11775

### B PATTERN

Jr.-Sr.-Open	Points
1. Steve Buck	482
2. Keith Fisher	468
3. Ben Mathews	450
4. Ernie Weiss	422
5. Robert Eason	394

#### Best Junior

None flew

#### Best Senior

Steve Buck

### A PATTERN

Jr.-Sr.-Open	Points
1. Hank Clark	320
2. James Marshall	319
3. Paul Goell	311
4. Henry Smith	296
5. Randy Shartle	292

#### Best Junior

Brian McAvoy

#### Best Senior

Randy Shartle

### PYLON FORMULA I

Jr.-Sr.-Open	Points
1. Bertken/Smith	19
2. Alvin Sager	19
3. Vernon Smith II	18
4. Larry Leonard	17
5. Robert Upton	14

#### Best Junior

James Hiller

#### Best Senior

Bertken/Smith

### PYLON FORMULA II

Jr.-Sr.-Open	Points
1. Larry Leonard	20
2. Edward Keck	18
3. Vernon Smith II	17
4. Austin Leftwich	17
5. Telford/Violett	16

#### Best Junior

Bryan Sattler

#### Best Senior

Whit Stockwell

### SCALE

Jr.-Sr.-Open	Points
1. Edward Ellis	15236
2. Frank Nosen	14828
3. Richard Graham	14574
4. William Bertrand	12613
5. John Roth, Jr.	12001

#### Best Flight Achievement

Kenneth Drummond

#### Best Junior

James Hiller

#### Best Senior

Whit Stockwell



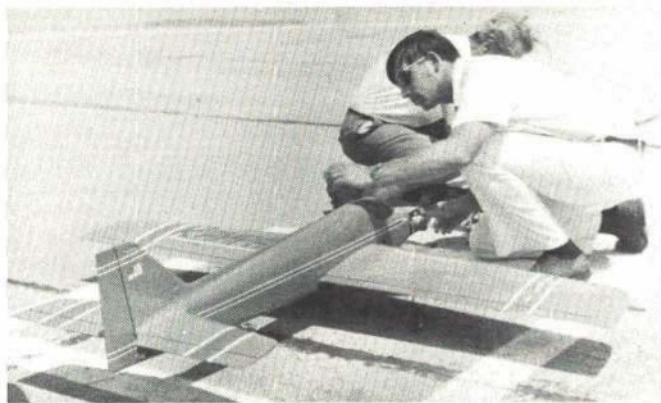
Claude McCullough flew a Douglas Sky Pirate in RC Scale. During the Nats an AMA Scale Contest Board was authorized, McCullough its chairman.



Above, Formula I start—Bud Phillips and Bror Faber in foreground. "Sandbagging" at the start was common. Right, it's nice to see RC Pylon togetherness when Lois and Brian Ehmke race.







New in RC D Pattern this year, but certainly not new to aerobatic flying is Jerry Worth. Many recognize him for his CL Stunt efforts.



Larry Leonard cleans up his Formula II Shushonick with which he placed first. He is the RC National Champion for the second year in a row.



Special thanks go to the Hewlett-Packard Co. and Collins Radio Company for loaning equipment (and training operators) for monitoring radio transmissions and possible interference.



Original model by Robert Eson placed 5th in B Pattern. It is powered by an Enya 60, KO muffler, Graupner plastic prop. Bill Loss holds.



Ron Chidgey named his original D Pattern model "Tiger Tail." It has a foam wing, muffled Lee Super 60 power, TF 11-7 1/2 prop.

## INDOOR

### CABIN

Junior	Time
1. Tom Sova	11:23.4
2. Michael Kuehne	7:41.8
3. Barry Pallet	5:03.0
4. Bruce Pallet	4:55.0
5. William Schlarb	4:33.8

Senior	Time
1. Ronald Ganser	13:51.7
2. Daniel Domina	13:43.2
3. Terry Kuehne	7:50.2
4. Dale Hacker	7:48.5
5. Susan Weisenbach	5:24.2

Open	Time
1. James Richmond	20:25.2
2. Bucky Servaites	19:16.2
3. Ronald Ganser	17:29.2
4. Charles Sotich	17:19.4
5. Al Rohrbaugh	16:36.2

### STICK

Junior	Time
1. Tom Sova	18:26.1
2. William Schlarb	11:05.0
3. Bruce Pallet	10:47.0
4. Michael Kuehne	10:43.1
5. Barry Pallet	9:34.0

Senior	Time
1. Jan Servaites	14:45.0
2. Ronald Ganser	14:09.8
3. Terry Kuehne	13:19.6
4. Jeffrey Annis	12:27.0
5. Susan Weisenbach	12:25.0

Open	Time
1. James Richmond	34:33.8
2. Clarence Mather	30:44.0
3. Ronald Plotzke	28:14.2
4. Daniel Belleff	26:55.6
5. Manuel Andrade	25:08.0

### PAPER STICK

Junior	Time
1. Barry Pallet	10:37.1
2. Tom Sova	10:26.8
3. William Schlarb	9:47.8
4. Michael Kuehne	9:06.5
5. Steve Bandt	8:57.0

### Senior

1. Jan Servaites	16:45.6
2. Jeffrey Annis	11:47.9
3. Richard Hixon	11:30.1
4. Susan Weisenbach	11:29.2
5. Dale Hacker	10:32.2

### Open

1. James Richmond	21:34.2
2. Al Rohrbaugh	20:20.3
3. Clarence Mather	18:50.6
4. Edward Stoll	18:24.0
5. Joseph Sova	16:44.7

### H.I. GLIDER

Junior	Seconds
1. Marty Thompson	118.2
2. John Lorbiecki	100.2
3. James Haught	89.6
4. Michael Taibi	85.3
5. Michael Kuehne	85.2

### Senior

1. Richard Hixon	116.0
2. Paul Andrade	108.6
3. George Pharr, Jr.	105.7
4. Paul Tobie	104.9
5. Daniel Domina	101.3

### Open

1. Dennis Bronco	128.6
2. Robert Watson	123.6
3. Bucky Servaites	121.4
4. Ronald Higgs	118.8
5. Rudy Kluber	114.0

### SCALE

Junior	Points
1. Michael Kuehne	105.0
2. Bruce Pallet	83.0
3. Michael Parykaza	78.3
4. Marty Thompson	77.5
5. Barry Pallet	72.5

### Senior

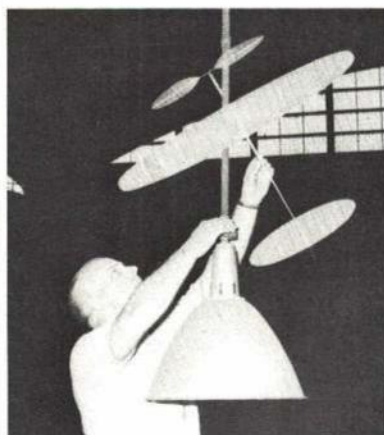
1. Daniel Domina	115.5
2. Terry Kuehne	103.5
3. Brian Webster	103.0
4. Robert Hanford	102.0

### Open

1. Ronald Martelet	172.5
2. Earl Thompson	160.3
3. James Richmond	154.7
4. Charles Sotich	151.0
5. Bucky Servaites	141.7



Bucky Servaites outflowed others for the FF Category Championship as well as the Open and Grand National.



Lowering lights helped Indoor retrieval. Ed Stoll unhooks Paper Stick model here, placed 4th. Armory had good conditions.



Size of Jim Richmond's Indoor Scale Pilatus Porter belies its airworthiness—did 3:23. Richmond was Indoor Champion.



A most remarkable model was the Ford Tri-Motor Indoor Rubber Scale model by Fulton Hungerford. Won new St. Louis Award.





Left, Marty Thompson shows off the style which garnered for him the Junior National Championship. YTO launch is of his Torp 40-powered Starduster 900, the beginning of one of the flights which placed him first in Class C. Right, former AMA president C. O. Wright still competes vigorously in the Nats. FF Scale Antoinette launch shown.



Weighing Wakefield is Chris Matsuno. Pipe-mounted balance rig checks both total weight and rubber weight depending upon hook used.



Jetex exhaust goes through tubular pylon of Charles Manson's model. Vintage wing has "PAA" markings.



Original Class B FF model by Bob Combs has high thrust line, low rudder, big 45% stab, powered by Supertigre 29.



A number of Canadians entered the Nats, among them Link Thomas, left, winding for Unlimited Rubber, and Willard Thompson, right, with A-2 Towline Glider. Peter Allnutt, another Canadian, won A-2 Towline both this year and last.



## UNLIMITED RUBBER

Junior	Seconds
1. Michael Taibi	487
2. Eric Hatschek	477
3. Peter Lewis	427
4. John Bennett	315
Thomas Dinelli	315
5. Gary Hungerford	298
Senior	
1. Mike Bailey	684
2. Paul Andrade	537
3. Gary Heeb	480
4. Donald Mackenzie	463
5. Brian Webster	444
Open	
1. Willard Smitz	2160
2. George Perryman	2118
3. Peter Allnutt	1260
4. Mike Thomas	1084
5. Sherman Ovelmen	717

## HELICOPTER

Jr.-Sr.-Open	Points
1. Glenn Lee	149.09
2. Richard Wetzel	126.66
3. Lee Taylor	105.00
4. William Ellerman	35.00

## ROCKET POWER

Junior	Seconds
1. Charles Krickel	264
2. William Schlarb	157
3. James Haught	141
Charanne Moore	141
4. John Lorbiecki	110
5. Rod Wilson	109
Senior	
1. Denny Dock	302
2. John Castiglioni	230
3. Robert Hanford	152
4. Richard Lyons, Jr.	74
5. Joseph Dzialo	38
Open	
1. Don Chancey	410
2. Charles Markos	377
3. William Haught	373
4. Charles Sotich	349
5. James Gremel	339

## NORDIC GLIDER

A-1 Junior	Seconds
1. John Petchler	552
2. James McCarthy	524
3. Kenneth Bauer	466
4. Eric Hatschek	432
5. Barry Pallet	396
A-2 Junior	
1. Marty Thompson	767
2. Ron Weaver	669
3. John Lorbiecki	666
4. James Haught	636
5. Wayne Friebls	596
A-1/A-2 Senior	
1. Donald Mackenzie	773
2. George Pharr, Jr.	697
3. Susan Weisenbach	676
4. Gary Myers	641
5. Robert Hanford	579
A-1/A-2 Open	
1. Peter Allnutt	900
2. Phillip Bayly	869
3. Richard Mathis	842
4. Thomas Hutchinson	840
5. Phillip Klintworth	835

## H.L. GLIDER

Junior	Seconds
1. David Uthoff	294
2. Robert Butley	221
3. Charles Krickel	176
George Hubschmidt	176
4. Tony Stuckwisch	172
5. Robert Faranda	169
Senior	
1. Ronald Ganser	287
2. Grady Turner	280
3. Denny Dock	271
4. George Pharr, Jr.	252
5. Terry Kuehne	210
Open	
1. Don Chancey	407
2. Richard Mathis	325
Charles Markos	325
3. Thomas Peardon	296
4. Frank Mock	287
5. Robert Watson	270

## FAI POWER

Junior	Seconds
1. James Haught	751
2. Michael Taibi	503
3. William Schlarb	406
4. Michael Kuehne	360
5. Marty Thompson	185
Senior	
1. Paul Andrade	791
2. Glen Poole	669
3. Lewis Cleveland	526
4. Terry Kuehne	182
Open	
1. Robert Watson	900
2. Andrew George	868
3. Thomas Hutchinson	860
4. Joe Beton	835
5. Rolland Anderson	834

## WAKEFIELD RUBBER

Junior	Seconds
1. John Petchler	302
2. John Bennett	253
3. Michael Kuehne	70
4. Keith Gordey	49
Senior	
1. Jan Servaites	561
2. Mike Bailey	531
3. Robert Hanford	499
4. Richard Hixon	403
5. Terry Kuehne	388
Open	
1. Frank Heeb	790
2. Dale Wilson	760
3. Jack McGillivray	720
4. Urs Schaller	694
5. Willard Smitz	656

## COUPE D'HIVER RUBBER

Junior-Senior	Seconds
1. John Petchler	492
2. Susan Weisenbach	421
3. Keith Gordey	261
4. Richard Hixon	258
5. Richard Persh	228
Open	
1. Joseph Macay	539
2. Richard Sherman	532
Larry Miller	532
3. Bucky Servaites	522
4. James Richmond	521
5. Charles Schobloher	519

## SCALE

Junior-Senior	Points
1. Michael Kuehne	311.0
Open	
1. Frederick Stark	550.5
2. Ronald Martelet	532.0
3. Robert Adair	518.5
4. Rudolph Stab	477.5
5. Bruno Markiewicz	451.0

## FREE FLIGHT—Outdoor

### 1/2 A GAS

Junior	Seconds
1. Stephen Klaus	540
2. Mark Kummerow	530
3. Frank Wolff	525
4. Marty Thompson	500
5. Glen Winkel	458
Senior	
1. Grady Turner	720
2. Pat McGehe	484
3. Alan Hofeldt	467
4. R. Robinson, Jr.	448
5. George Pharr, Jr.	440
Open	
1. Dennis Kargol	1080
2. Gilbert Robbins	720
3. Allan Vollmer	610
4. Vic Cunningham, Jr.	540
5. Jack Greene	530

### A GAS

Junior	Seconds
1. Marty Thompson	1027
2. Randy Weller	889
3. Michael Taibi	685
4. Brian Pardue	599
5. Gerald Comp, Jr.	530
Senior	
1. Brian Webster	1014
2. Howard McCarthy	502
3. Richard Lyons, Jr.	490
4. Mike Hallum	487
5. David Berquist	486
Open	
1. Andy DeMello	1260
2. William Wall	1236
3. Dennis Bronco	1200
4. Anthony Italiano	1175
5. Gerald Comp	1020

B GAS	Seconds
1. Marty Thompson	1080
2. Michael Taibi	662
3. Larry McFarland	445
4. Kevin Hayes	416
5. Roger Greene	406

C GAS	Seconds
1. Marty Thompson	1024
2. Kevin Hayes	476
3. John White	450
4. John Lorbiecki	407
5. Robert Butley	395
Senior	
1. Grady Turner	496
Brian Webster	496
2. Pat McGehe	488
3. Robert Hanford	479
4. Lewis Cleveland	472
5. Gary Myers	415
Open	
1. Frank Wolff	1031
2. Robert Sifleet	1013
3. Glenn Schautz	1002
4. William Wall	972
5. Charles Harper	960

FAI POWER	Seconds
1. James Haught	751
2. Michael Taibi	503
3. William Schlarb	406
4. Michael Kuehne	360
5. Marty Thompson	185
Senior	
1. Paul Andrade	791
2. Glen Poole	669
3. Lewis Cleveland	526
4. Terry Kuehne	182
Open	
1. Robert Watson	900
2. Andrew George	868
3. Thomas Hutchinson	860
4. Joe Beton	835
5. Rolland Anderson	834

WAKEFIELD RUBBER	Seconds
1. John Petchler	302
2. John Bennett	253
3. Michael Kuehne	70
4. Keith Gordey	49
Senior	
1. Jan Servaites	561
2. Mike Bailey	531
3. Robert Hanford	499
4. Richard Hixon	403
5. Terry Kuehne	388
Open	
1. Frank Heeb	790
2. Dale Wilson	760
3. Jack McGillivray	720
4. Urs Schaller	694
5. Willard Smitz	656

COUPE D'HIVER RUBBER	Seconds
1. John Petchler	492
2. Susan Weisenbach	421
3. Keith Gordey	261
4. Richard Hixon	258
5. Richard Persh	228
Open	
1. Joseph Macay	539
2. Richard Sherman	532
Larry Miller	532
3. Bucky Servaites	522
4. James Richmond	521
5. Charles Schobloher	519



# AMA News Extra . . . . .

## 1970 CONTROL LINE WORLD CHAMPIONSHIPS

Terrific is a word which describes the kind of flying U.S. team members did in the Control Line World Championships at Namur, Belgium, August 19-23. Our competitors placed first both individually and as a team in Speed and Aerobatics. In Team Racing, Russia swept the field, although America's Theobald/Barr was close behind in fourth, and the team finished second. Word is that Albritton/Marvin likely would have qualified for the Final Race had their first flight not been disqualified for a passing infraction. The official results:

SPEED: 1st--U.S.A.; 2nd--Russia; 3rd--France

Pl.	Competitor	Country	1st	2nd	3rd	Best km/hr
1.	Arnold Nelson	U.S.A.	240.0	-	-	240.0
2.	Jim Nightingale	U.S.A.	218.1	238.4	235.2	235.2
3.	Jackson	Gt. Britain	229.2	227.8	229.2	229.2
4.	Dusi	Italy	-	225.0	225.0	225.0
5.	Glenn Lee	U.S.A.	225.0	198.8	223.6	225.0
6.	Rodzher	Russia	210.5	220.8	219.5	220.8
7.	Wamper	E. Germany	216.8	220.8	218.1	220.8
8.	Volkov	Russia	210.5	218.1	220.8	220.8
9.	Burrus	W. Germany	220.8	-	209.3	220.8
10.	Jarry-Desloges	France	-	206.8	220.8	220.8

AEROBATICS: 1st--U.S.A.; 2nd--Czechoslovakia; 3rd--Italy

Pl.	Competitor	Country	1st	2nd	3rd	Total 2 Fl.
1.	Bill Werwage	U.S.A.	932	979	945	1,924
2.	Bob Gieske	U.S.A.	969	933	951	1,920
3.	Gabris	Czechoslovakia	877	951	946	1,897
4.	Gerald Phelps	U.S.A.	924	944	942	1,886
5.	Billon	France	875	935	911	1,846
6.	Canj	Czechoslovakia	929	893	859	1,822
7.	Compostella	Italy	877	903	904	1,807
8.	Anderson	Sweden	816	897	889	1,786
9.	Rossi	Italy	883	882	877	1,765
10.	Van Den Hout	Holland	855	888	877	1,765

TEAM RACING: 1st--Russia; 2nd--U.S.A.; 3rd--Great Britain

Pl.	Competitor	Country	1st Heat	2nd Heat	Final Race
1.	Babichev/Krasnorutsky	Russia	4:17.0	4:37.0	8:55.8
2.	Plotzinjsh/Timofeev	Russia	4:30.8	4:38.1	9:13.0
3.	Onufrienko/Shapovalov	Russia	4:53.0	4:27.7	d.n.f.
4.	Theobald/Barr	U.S.A.	4:35.5	4:45.8	
5.	Bader/Kaul	W. Germany	4:44.0	4:44.7	
6.	Sundell/Sundell	Finland	5:15.9	4:45.8	
7.	Metkmeyer/Metkemeyer	N.L.	disq.	4:46.4	
8.	Schwarz/Ilg	W. Germany	5:10.9	4:47.1	
9.	Gurtler/Baumgartner	Austria	disq.	4:47.2	
10.	Magli/Ferroni	Italy	4:49.5	disq.	
18.	Albritton/Marvin	U.S.A.	disq.	5:00.4	
21.	Wright/Dunkin	U.S.A.	5:05.5	5:13.3	



## 1970 Nats

(Continued from page 47)

—the other B-36 entrant) also showed everyone how to start engines. They consistently started all six engines on each plane in a minute or less, in contrast to some single engine entrants who missed a turn when they couldn't get started within three minutes.

Interesting complaint from some RC Scale contestants: they hardly had time to clean up and refuel after one flight before being called up for the next.

RC Pattern contestants were generally happy about how their part of the Nats ran. D Pattern (FAI) contestants got eight rounds of qualification flying in, plus six rounds in the finals; A and B Pattern flyers got four rounds.

The shared-time concept for Nats RC, originated by Ed Shipe (Santa Barbara, Calif.), was developed in detail by the overall RC Director. See the July 1970 issue. It proved to be all that was promised, making possible the flying of Pattern, Scale and Pylon Racing on two days instead of three days, thus permitting the addition of A and B Pattern to this year's Nats.

Another innovation for Nats RC was the use of grandstands for Pattern and Pylon Finals' spectators. It was particularly beneficial for those viewing the climaxing four hours of Pylon flying. Extremely close races, a good view, and loudspeaker commentary provided a tremendous degree of excitement that had cheering sections roaring constantly. The Pylon event officials did a great job of keeping the action moving constantly.

It was the greatest RC Nats yet, according to both contestants and officials. The main point seemed to be that everyone got a fair shake—that despite the minor inequities that plague any large meet, there was enough flying available to fairly determine the winners. A common remark among the losers was that they couldn't blame the system this year.

Outdoor Free Flight benefited from one major improvement over previous Nats. For the first time in many years the same crew of officials worked all the events, in contrast to the past when different event directors were used every day. As a result the FF events quickly shook down to smooth and consistent operation.

Elimination of the first flight by noon rule of previous Nats proved to be a good thing, substituted for by a sharp event cutoff time. Fear of getting caught by the latter was effective in avoiding late jams which had been the original cause of instituting the noon rule in other years.

Free Flight, as usual, had the most contestants per event. Ten events had over a hundred entries each, and the three largest had much more: 1/2 A Gas and HL Glider had over 300, A Gas and Nordic Glider had over 200. Coupe D'Hiver, a brand new event for this year's Nats, drew 103 entries.

Scoreboard-type posting of results in all Free Flight events also contributed to contestant satisfaction. Entrants could view all standings at any time, so avoided was much confusion, uncertainty, and questioning of officials.

AMA HQ developed the special scoreboards which also doubled as event master records. As a result of the Nats success they are being made available to all Contest Directors for general meet use—they are suitable for all categories

of competition. Write to HQ for a sample and prices.

Safety was greatly increased in Free Flight at the 1970 Nats. Despite many years of previous trying, it has always been difficult to get cars parked upwind of the launching area. This year the effort was successful, aided by winds which generally were consistent in direction and also by officials who kept tighter rein on permissible launching areas.

Indoor had two good days of flying in near perfect draft-free air. As a result, despite a somewhat less than ideal site, performances were excellent. The topper was Jim Richmond's 34 minute, 33 second flight in the Indoor Stick event—a fabulous achievement in a building with less than 100 feet in ceiling height. Richmond also placed first in three of the five events to become the Indoor Category Champion.

Indoor also had some great hand-launched glider performances, with three entrants averaging over one minute. Open class entrant Dennis Bronco, (Lakewood, Calif.) came out on top with a two-flight total of 128.6 seconds, but Junior Champ Marty Thompson (Livermore, Calif.) was close behind with 118.2 seconds.

An incredible Ford Tri-Motor Indoor Scale model by Fulton Hungerford (Titusville, Fla.) had everyone amazed. Weighing only an ounce, it lacked nothing in detail, including corrugated covering. Its three props were driven by three rubber motors, one in the fuselage and the others spanwise in the wing. Only about a foot in span, the model had true scale construction inside and out—probably the most magnificent example of craftsmanship at the Nats. Its only weakness was in flying performance; otherwise it stole the show.

Another unique Indoor model was the 42" Stick entry of Ron Plotzke (Mt. Clemens, Mich.). This huge but graceful microfilm-covered model placed third with a flight of over 28 minutes. It was an outstanding example of intricate cross-trussing and delicate construction techniques.

Control Line performances were dominated by the CL Category Champion Danny Bartley (High Point, N.C.). Although a Senior age contestant, he beat out many adults, placing in eight events and taking five first places. His nearest competition was over 100 points behind in the Category Championship race.

Scale Racing, better known as Good-year, proved to be extremely popular in its first Nats appearance on the official event schedule. With 119 contestants, the event had to have a second circle added in order to get all the flights in. Open winner John Burnhart (Chicago, Ill.) was the top placer with a time of 7 minutes, 36 seconds.

Combat, as in '69, was an extremely crowded event with 157 entries, which took every bit of time available to run off, especially in the Open age category which had 84 contestants. Past Nats experience of officials paid off in a smooth running event despite extreme pressure—only minor complaints and disputes were involved in what is always the most violently contested event at the Nats.

C Speed produced the fastest times of all Nats events, even topping Jet Speed. There were four C Speed flights of over 180 mph, led by the Roselle-Frye team (Dayton, Ohio) performance of 189.40.

Young Danny Bartley stayed right near them, however, by recording the top Senior C Speed flight of over 186 mph.

Control Line Stunt was treated to some new techniques in judging and event organization. Navy personnel were greatly impressed by the training session in which they were given judging instructions—a naval aviator on the scene remarked that the training was equivalent or superior to military flight instruction. It all paid off, as there were 93 contestants entered.

Carrier events also had more than a hundred contestants to contend with—57 in Profile Carrier alone. Unfortunately, the circle layout was arranged for two carrier decks, and when a third had to be utilized due to the numbers involved, there was an awkward model and line processing arrangement which drew complaints. Otherwise the event proceeded smoothly.

Bucky Servaites (Dayton, Ohio) was again Grand and Open National Champion this year, as in '69. He also took home the new Free Flight Category Champion trophy. Bucky was the only one competing for Individual Champ who topped 800 points; the next three nearest were in the 700's.

Larry Leonard (Northridge, Calif.) is the 1970 Radio Control Category Champion, repeating his 1969 performance. He was up against tougher competition  
(Continued on page 80)

Indoor Modelers—want results of the December CIAM meeting (with possible rule changes) in a hurry? Send stamped, pre-addressed envelope with request for same to AMA HQ—will be mailed as soon after the meeting as possible.

## CONTEST CALENDAR

### Official Sanctioned Contests of the Academy of Model Aeronautics

Oct. 3-4—Tulsa, Okla. (AA) RC Formula Gala Meet. Site: Glue Dobbers Field. W. Salnikov CD, Rt. #1, Box 130-C, Coveta, Okla. 74429. Sponsor: Tulsa Glue Dobbers, Inc.

Oct. 3-4—Montevallo, Ala. (AA) Birmingham RC Contest. Site: "X" Ranch Field. E. Riley CD, 1924 2nd Pl., N.W., Birmingham, Ala. 35215. Sponsor: Birmingham Radio Control Club.

Oct. 3-4—Santee, S.C. (A) Wings & Wheels RC Jamboree. Site: Wings & Wheels Museum. R. Thompson CD, P.O. Box 621, Sumter, S.C. 29150.

Oct. 3-4—Sebring, Fla. (AA) Hurricane FF & CL Meet. Site: Sebring Airport. R. Fritz CD, 3812 Pelican Ln., Orlando, Fla. 32803.

Oct. 3-4—Jamestown, N.Y. (AA) United RC Pylon Racing Circuit Championships. Site: Winch Rd., Lakewood, N.Y. H. DeBolt CD, 3833 Harlem Rd., Buffalo, N.Y. 14215.

Oct. 3-4—Amarillo, Tex. (AA) ARKS 10th Annual RC Contest. Site: Club Flying Field. B. Irwin CD, 3302 Lewis Ln., Amarillo, Tex. 79109. Sponsor: Amarillo Radio Control Society.

Oct. 4—Arlington, Tex. (AA) Ft. Worth Plainemen Fall Annual FF Meet. Site: Arlington. C. Davis CD, 7612 Sybil Dr., Ft. Worth, Tex. 76118. Sponsor: Ft. Worth Plainemen.

Oct. 4—Dayton, Ohio (AA) Cold Cash CL Bash. Site: Municipal Model Flying Field. H. Roe CD, 165 Broadripple Rd., Centerville, Ohio 45459. Sponsor: Dayton Buzzin' Buzzards.

Oct. 4—Pittstown, N.J. (AA) Central Jersey 1970 Eastern States RC Championships. Site: Sky-Manor Airport. L. Shulman CD, 42 Blake Ave., Cranford, N.J. 07016. Sponsor: Central Jersey Radio Control Club.

Oct. 4—Watsonville, Calif. (A) RC Bee's Santa Cruz County RC Meet. Site: Peterson Ranch. W. Pritchard CD, 9 Debbie Ct., Boulder Creek, Calif. 95008. Sponsor: RC Bee's.

Oct. 4—Lincoln Park, N.J. (AA) 12th Annual CL Model Air Show. Site: GSCB Club Field. E. Dickson CD, 36 Vreeland Ave., Clifton, N.J. 07011. Sponsor: Garden State Circle Burners, Inc.

(Continued on page 79)



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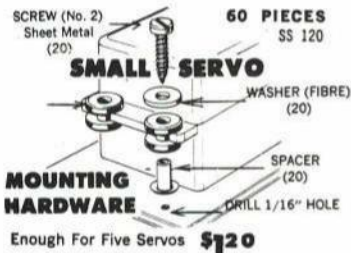


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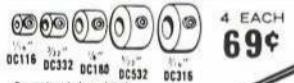
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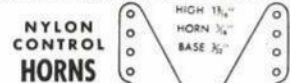
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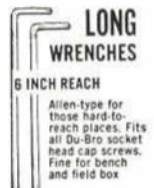


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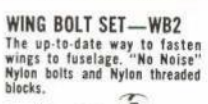
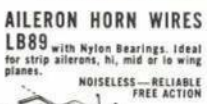
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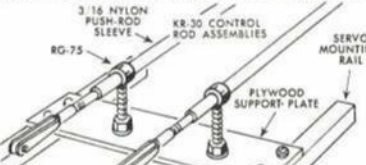
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106 Fiat B-20	161 Aero Vulcan	
107 B-26C C Marauder	162 PZL P-24	
108 E.E. Lightning I	163 Douglas TBD	
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**Havoc**

(Continued from page 41)

rop P-61 Black Widow, the first American airplane designed strictly for night fighting. Some later model P-70A's got into combat in the Pacific, but most were limited to training activities.

Considerable interest was shown in developing a photoreconnaissance version of the A-20. With the addition of camera equipment and a variety of experimental combinations of machine guns, three were tested as XF-3 and YF-3 in 1940. Then a reconnaissance version of the A-20B, to be called the O-53, was planned. No fewer than 1489 were ordered, but the idea was dropped before any were built. Finally, in 1944, the F-3 program saw 46 A-20J's and A-20K's modified into F-3A's.

The U.S. Navy got into the act, briefly and unsuccessfully. Between one and four A-20A's were turned over to the Navy to be tested as BD-1's. An additional eight A-20B's became the Navy's BD-2, but none of them advanced beyond the research and development stage. The BD-1 designation reappeared in the early 1960's on the prototype light plane designed by Jim Bede and eventually marketed as the American "Yankee." Obviously, this was just a coincidence.

Of all the interesting variations of this Douglas airplane, the A-20G was the really important model, accounting for almost 40% of the total production. They all had the 1600-hp Wright R-2600-11 engines, but armament differed considerably. The A-20G-1 had four 20-mm cannon and two .50-cal. machine guns in the nose, a .30 or .50 cal. machine gun alongside the nose, and a .50 cal. in the rear cockpit. Later, the four cannon were replaced by four more .50 cal. machine guns. Wing racks for up to 2000 lbs. of bombs were installed on the -20 and subsequent versions, along with a new power-driven rear top turret having two .50-cal. machine guns.

By the time the final A-20K was delivered to the USAF in September 1944, a total of 7385 had been built. And, while it was the end of the line for one proud airplane, it was the beginning for its successor, the Douglas A-26 Invader. The newcomer was larger, faster and packed a greater wallop, but it was unmistakably the big brother of the Havoc, and so its achievements in the closing months of World War II and in the Korean Conflict are more than slightly

related to the history of the A-20. What remains of the A-20 after all these years, besides memories? As far as can be determined, the only one left in recognizable shape is an A-20G (S/N 322200), properly restored and parked in the outdoor display area of the USAF Museum at Wright-Patterson AFB, Ohio, alongside its brothers-in-arms.

## Year of the Retractable

(Continued from page 25)

found in modern digital servos and have capacitor noise suppression. They come wired to connectors, ready for use. MK also offers an amplifier for driving servos direct from the receiver, and an SPDT switch which may be triggered from throttle linkage. Servo operation is quiet and smooth, and gears rise in about two sec.

THE NEVER FAIL RLG is pneumatic and operates from a tap on the engine crankcase. Gear units are built on sturdy aluminum frames, pistons are spring-loaded to assure dropping wheels if the engine stops, and all gears lock both up and down. Nose gear is steerable and designed for horizontal mounting. The system operated on five-lb. pressure. Operation is quite fast going up, virtually instantaneous going down. Units are mostly metal, but most metal-to-metal contact is eliminated.

THE P.M.W. SYSTEM is well thought out, neatly made, and light in weight. The 2" gas cartridge (3/4" dia.) is held by a nylon clip and is easily removed for refill. This cartridge is connected to the valve's power ram unit by 11" of tiny metal tubing. Ram movement is about 3/8" maximum.

A large can of Freon comes with these units, plus a valve which screws on the can. It takes only a few minutes to fill the cartridge from this large can—a simple procedure. The makers claim 25 operations per cartridge filling. The single power ram is intended to operate all the RLG units on a plane. The valve on the power ram assembly takes only an ounce or two to move, and movement is about 3/16".

Two styles of P.M.W. wing gears are made, one (PR-1) pulls the gear up spanwise, as would be needed on a P-51. The PR-2 folds the gear chordwise, as well as rotating the wheel and strut so the wheel fits into its well, as in the P-40. The two units are quite different in construction and action. The PR-1 is based upon specially-bent torsion bars

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15	1 3/8 x 1	3 1/2	N.A.	N.A.	YES	.15 — .19	3.65 N.A.
30	1 5/8 x 1	5 1/2	2	YES	YES	.29 — .40	3.95 4.45
30DR K & B <sup>3</sup>	1 5/8 x 1	5 1/2	2	YES	NO	K & B 30RR	7.50 8.00
45	1 3/4 x 1	7 1/2	2 3/4	YES	YES	.40 — .60	4.35 4.85
45DR K & B <sup>3</sup>	1 3/4 x 1	7	2 3/4	YES	YES	K & B 40RR	7.95 8.50
45DRR <sup>4</sup>	1 3/4 x 1	7	N.A.	YES	NO	ROSSI 60	7.95 N.A.
60DRR <sup>4</sup>	2 x 1	9 1/2	3 1/2	YES	NO	OPS, HP61RR	8.75 9.25
Super Tigre .15	2 x 1	9	3 1/2	YES	YES	.60 — .80	4.95 5.45

<sup>1</sup> For rear rotary engines. <sup>2</sup> For crankshaft rotary engines. N.A.—not available.  
<sup>3</sup> For new engines, enduro racing, heavy boats, larger, submerged or surface props.  
<sup>4</sup> For seasoned engines, multi-racing, light hulls, smaller props.  
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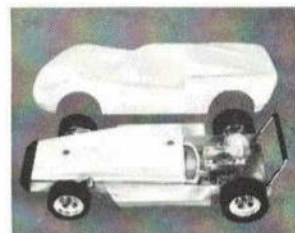
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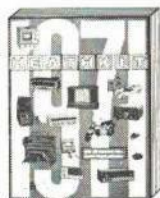
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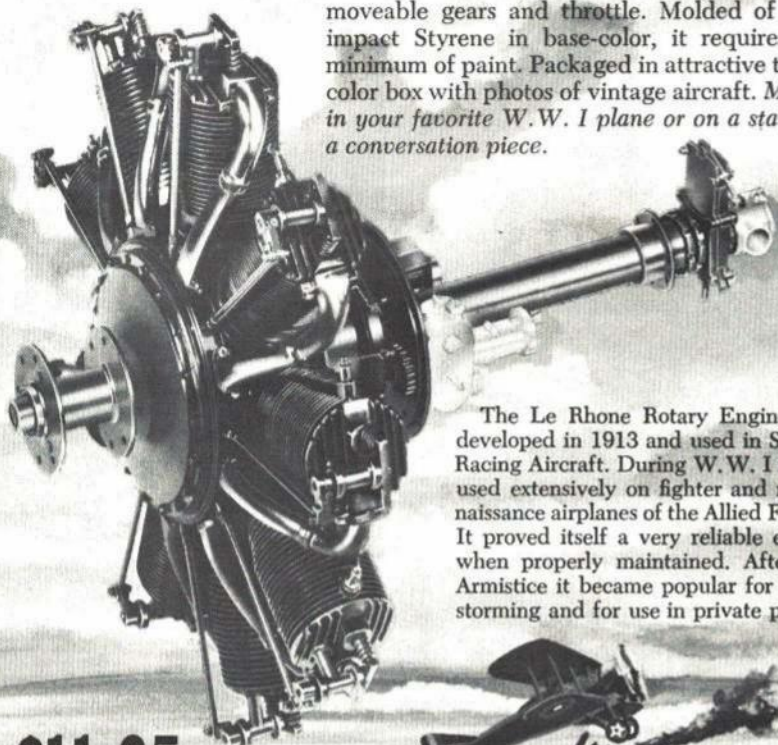


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that fit into hardwood holders like fixed LG legs. The outer end of each bar wire (wires and struts are 5/32" music wire) is bent to form a pivot point for the molded plastic piece which carries the wire wheel strut; the latter is fastened with two Allen-head setscrews.

Operating links are of 3/32" music wire, furnished in two lengths for each side of the wing, with a coupler, so the length can be adjusted to the setup. Couplers then join the smaller wire halves permanently by soldering. A heavy bellcrank formed from 3/32" thick fiberglass-epoxy sheet is pivoted at the center of the wing; one operating link goes in each "ear" of the bellcrank, another link goes to the servo or power unit. The operating links are so arranged that the gears lock when down—link pivot points in the arm in line with bellcrank pivot. When retracted the gears do not lock, so they must be held in this position by the servo or power unit. Wheels should retract toward the center of the wing.

The P.M.W. PR-2 units come mounted on plates of 1/4" thick ply, measuring 2 1/2 x 6". These plates are attached to the wing's underside and spaced chordwise to allow room for chordwise retraction and a wheel well. The torsion-bar system is utilized. A guide rod must be soldered to the upper end of each strut. Strut and wheel are rotated 90 degrees as the gear moves up or down. The mechanism locks with wheels extended. Operating rods from each wing unit—units are made in right and left—join at wing center with the combined coupler and control horn. Necessary hardware is furnished for both types.

PR-1 units have no metal-to-metal joints; the PR-2 system has several. Plastic bushings are used at other points for isolation to prevent extended runs of metal parts from one wing to other. Rugged and quite simple in design and construction, these units have no spring compensation, so fairly potent operating sources are required.

ROWAN GAS-OPERATED system from Germany includes three quite similar wheel units, a small valve and a bottle of gas. Makers claim 60 to 70 system operations from one tank. Units are interconnected with tough plastic tubing, about 5/32" dia., and screw-on fittings. LG units are extremely simple with few parts; the nose gear unit differs only in having an attached aluminum bracket with linkage provisions for steering. Wheel legs are locked in down, but held up only by gas pressure; a spring in the cylinder forces gear down. All legs are easily adjustable for length and bent for wheels. Gas tank measures about 6" long and 1 3/8" dia.

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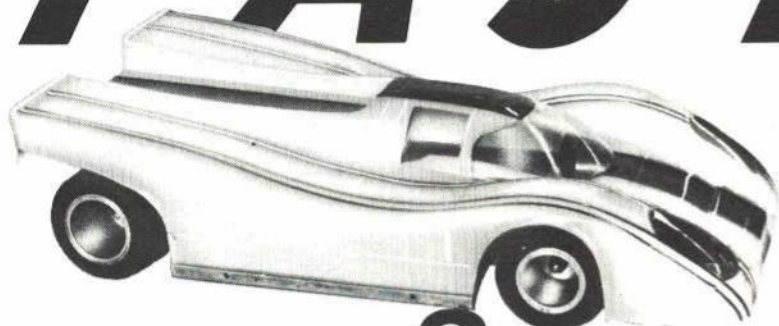
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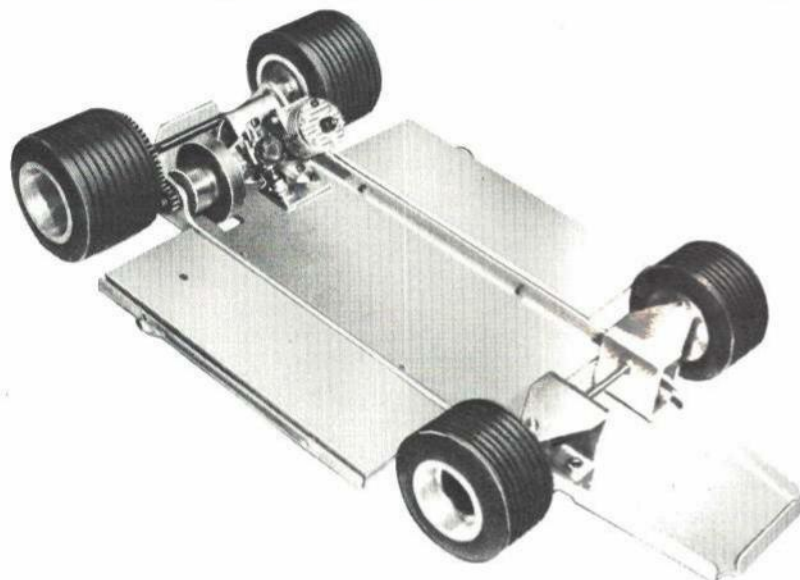
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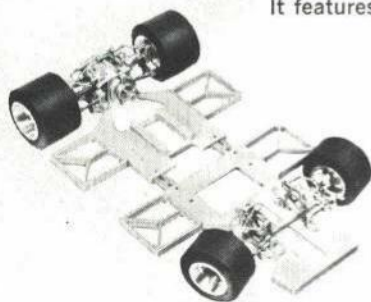
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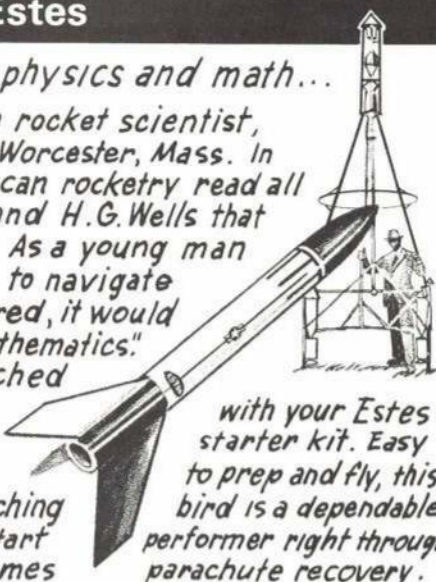
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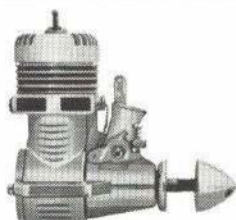
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MAX HESTER - 3 times Nationals RC scale winner...Internationals team member and winner of hundreds of smaller RC scale and pattern contests. Max is 45 years of age and has been flying RC for 20 years. He is plant superintendent for Sig Manufacturing Company.



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Wt. \_\_\_\_\_ 4½ oz.

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Nelson Model Products (Rowan's distributor) can supply refilling valve for use with standard can of Freon, purchased locally. Valve assembly will cost about \$4; cans of Freon, \$2.

WING POSI-TRACT UNITS are the only present ones to have a built-in electric motor. Practically the same unit is used for both nose and wing positions. Nose gear may be mounted either horizontally or vertically and is fully steerable. The new Olympic units require only two wires to each gear and have two simple SPDT switches for operation. All gears operate together, but each has built-in limit switches, as well as capacitor and RF choke suppression of electrical noise. They work on 3.6V (not center-tapped). They require about ten sec. to retract, current running 200 to 350 ma. Several styles of 5/32" dia. wheel legs are available. Plastic dust covers are offered at extra cost. Units lock in any position because of the style of gearing used. Apparently, the maker feels it is sufficiently rugged to take inevitable abuse. Units are mostly plastic, including all gears except motor pinion.

CAS GEAR UNITS operate much on the same principles as the KDH (see Fig. 3), are all-metal and spring-loaded so that extra-powerful servos are not required. They are compact and have smooth action. Main gear legs do not have shock-absorbing coils in the wire, but the nose gear has five-turn shock coil. All legs are easily replaceable by loosening one setscrew. A single ordinary servo (no special 180-degree servo needed) will operate an entire trike gear setup. With spring assist and smooth action, this seems possible. About 11/16" thrust movement is required for operation. Spring tension is easily adjustable for different wheel weights and a simple ingenious mounting scheme is included. With each gear comes a plate of 3/16" ply—7½ x 3½" for main gear units, 7½ x 2½" for nose gear. Plates are printed for RLG unit mounting holes and for cutout to clear retracted gear leg and wheels. Holes for wheels of 2¾" to 3" dia. are indicated.

RMK SPECIAL GEAR UNITS are intended to operate from RMK special rotary servos, but can be handled by any other adequately powerful servo. Units are not spring-loaded, so one servo for nose gear and one for two wing units are probably mandatory. Although from the same maker, they are entirely different in appearance and design from other MK units reviewed. RMK special units also operate on the principle shown in Fig. 3.

Main gear units have single 5/32" music wire leg with three-turn shock

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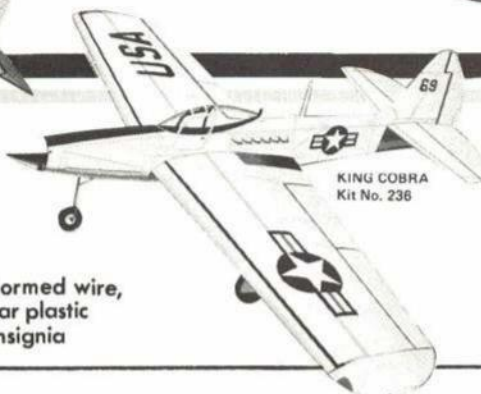
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Now from POCHER comes an exciting new model in their 1:8 scale series. The Rolls Royce Phantom II Coupe marked the introduction of one of the worlds great classic cars. Fitted with a Sedan body, this automobile offered the finest in motor- ing pleasures.

Over 2000 parts, mostly metal, in the Rolls Royce Kit provide the finest automotive model yet produced. Scale features include working suspension steering, brake system, opening doors, individual spoked wheels and realistic roll back top.

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coil. Nose gears have dual  $\frac{1}{8}$ " music wire legs, with four-turn coil in each leg. Main gear legs are easily replaced by removing one screw. Nose gear wires are straight as received, length is adjusted to suit when axle parts are assembled. Nose gear is designed to mount on the firewall's back surface. Leg is steerable. Units are mainly metal; the few plastic parts used eliminate most metal-to-metal contacts. Connections to operating and to steering pushrods are plastic. Servo movement required is  $\frac{5}{16}$  to  $\frac{3}{4}$ ", depending upon the hole used in operating arm. Since gears lock both up and down, a 180-degree servo is not necessary, but a strong servo is important.

#### References

- (1) RC Piper Comanche, Ralph Jackson, May/June 1966 AM, p. 13.
- (2) UC scale B-17G, Laumer and Simmance, July/Aug. 1963 AM, p. 17.
- (3) Pictures, data on UC P-38 RLG system, H. Ogden, May 1967 AM, p. 29.
- (4) Data on Centralk RLG in UC plane, AM Annual for 1965.
- (5) Data on Centralk RLG in UC plane, Feb. 1967 AM, p. 23.
- (6) Pneumatic RLG system for RC plane, Dale Root, Jan./Feb. 1966 AM, p. 14.
- (7) Pneumatic RLG system for UC Stunter, Harold Price, Jan./Feb. 1964 AM, p. 36.
- (8) Bill Bertrand's RLG unit, March 1966 AM, p. 64.
- (9) Modifications to BK RLG units, Martin Dietrich, June 1968 AAM, p. 30.

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— Fine thin cuts for those thick pieces —



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#### On the Scene

(Continued from page 12)

smooth operation with minimum delay between flights. Finalists in D N & E, using a full pattern, competed on Sunday.

Among the 13 entries in Scale was Ken Drummond's six-engine B-36 which had to be seen to be believed. And it flew beautifully! The racing events drew 27 contestants in Formula I, nine in FAI Pylon, and 25 in Sport Pylon. Extremely trying wind conditions kept times down and mortality high.

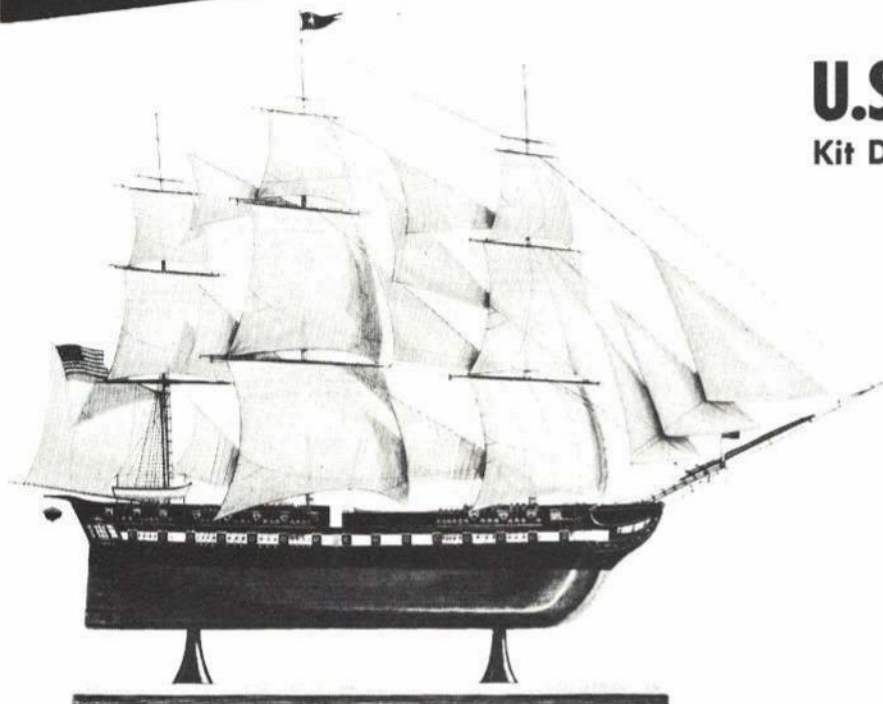
Perhaps the most gratifying event was FAI Pylon, conducted under the FAI provisional rules. Standard 25/75 fuel (Zero Nitro) was used and mufflers were required. Despite high winds, Harold deBolt had the fastest heat of 2:18; which is competitive by any standards. His opinion was: "This is a heck of a good event if they would only get rid of the blankety-blank mufflers!" However, to me the sound was beautiful, and the ships even look faster when they are quiet. Zero Nitro sure does save the finish and dollars.

Winners in the events were as follows: Class A Jr./Sr., James Carlson; Class A Open, Donald Love; Class B, Ted Berman; Class D Novice, M. C. Reed; Class D Expert, Ed Keck. Also: Scale, H. Vandiver; Formula I, Marvin Kowalewski; FAI Pylon, Maurice Woods; Sport Pylon, Dave Penry; and Biplane Pattern, Dave Corven. As is customary, a Grand Champion was crowned. Marvin Kowalewski took that honor with a win in Formula I and places in FAI and Sport Pylon. Meet you here next month!



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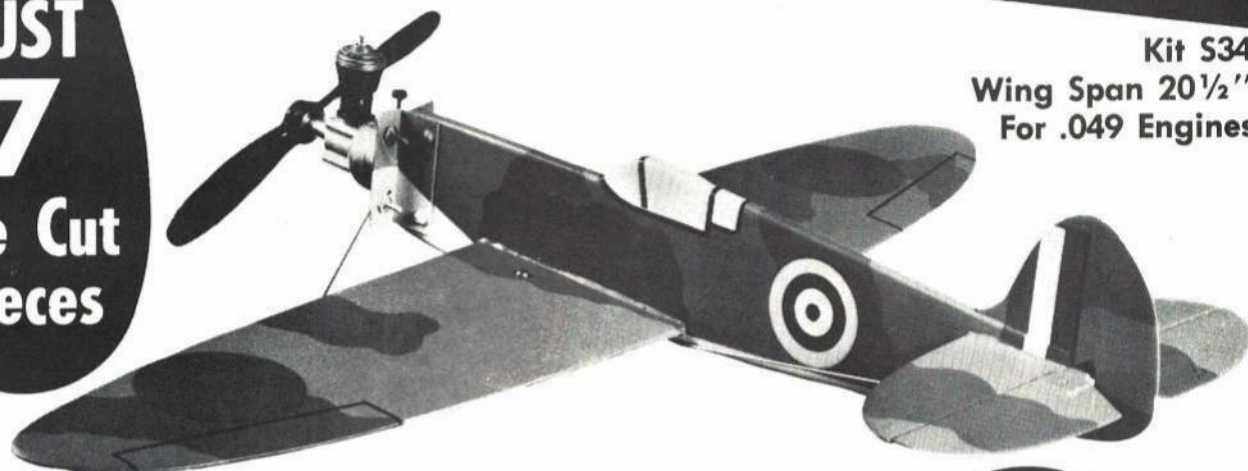
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**Kit S34**  
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**For .049 Engines**

The world-famous World War II Fighter — now amazingly simplified for beginners! Die-cut balsa wing and tail makes assembly just a matter of minutes! NO TISSUE COVERING! Engine and control system installation now a snap for anyone because this kit includes Aluminum motor mounts, Bell crank and Elevator horn — as well as finished Landing gear, Wheels, British Royal Air Force insignia and assorted Hardware. Plans and instruction are simple and complete.

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EVERY STUNT  
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### **SCHWEIZER SGS 1-34 SAILPLANE**

KH PS-26 Span 8 ft. 2½ in. Area 615 Sq. in. Wgt. 2¼ lbs. (less R/C) Scale 2 in. = 1 ft.  
CAN BE FLOWN WITH SINGLE CHANNEL THRU FULL HOUSE R/C

**\$23.95**



### **LANCER Advanced R/C Stunt Trainer**

KH PS-25 — Span 53½", Area 525 sq. in. Wgt. 3¼ lbs. (less R/C). Engine .35 to .51  
ASSEMBLES QUICKLY AND EASILY. SUPERBLY RESPONSIVE IN FLIGHT

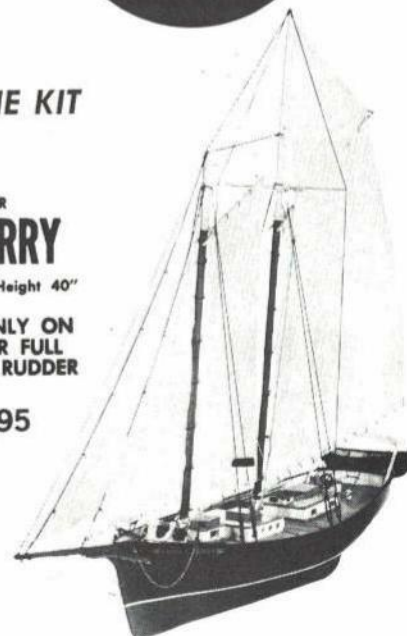
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Length 49½" Beam 10¼" Height 40"

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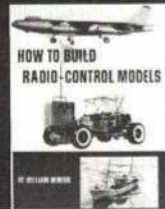
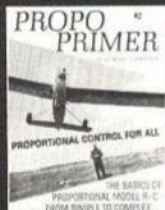
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Distinguished eagle, framed exquisitely on a  
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Proud emblem for the noble Tenderfoot on  
one by two-inch oval insignia...15¢ ea.; 4/50¢

## Smith on C/L

(Continued from page 35)

engine size and line length. (Line length same as AMA requires. See list at end of rules.)

(7) Takeoffs score one to five points, landings score one to ten points. (8) Blue zone scores 20 points; white zone, 15 points; red zone, ten points. (9) All laps must be in selected color zone to score points. (10) Failure to stay in selected color zone is an attempt. (11) Three attempts allowed for three official flights. (12) Speed points are mph minus engine displacement.

(13) Models may score up to 105 points for workmanship. CD's can use own point system to judge static (appearance) points. (14) Landing gear and canopy are required. (15) Motor run is not to exceed four minutes. (16) No pressure fuel systems are allowed. (17) No single line control system may be used.

Model Classes (Junior only)	Engine Size	Line Length	No. of Laps
1/2 A	to 050	35'	6
A	051-19	52' 6"	8
B	19-36	60'	7
C	401-650	70'	6

Seniors and Open: Same as above with the following changes: 1/2 A line length is 42 ft. and trimmed for five laps.

Class A: up to .1526 cu. in.; Class B: .1526-.300; Class C: .301-.650.

Well, there it is. A few dollars for the pylon and a fun event is all set. To add interest, have contestants fly in several different color zones in each flight. For example: two laps red, two laps blue, and finish with two laps in the white zone. Or get the hot-shot stunt fliers out and have them fly some laps upright, then some inverted or, for real skill, have them loop with the bottom of the loops cutting through a preselected color zone. The last should separate the men from the boys! While originally set up as a Sportsman Race, this event's possibilities are endless. Just be sure to have enough hardware for the winners. That first trophy can be mighty exciting for a Junior in his first contest.

This would be an ideal event for an after-hours activity at the Nats. It should be a natural step up from the Delta Dart program. Literally tens of thousands of Ready-to-Fly models are sold each year, but no competition events are open to them. Prizes can be trophies for the first three and Certificates of Participation for all other contestants. These certificates can be inexpensive. How about the HIAA having them printed up and distributing them through the AMA to CD's who then could run such an event along with their scheduled program? This should bring out the Juniors. . . .

Drill Straight Holes: A quickie drill jig can be used to drill true holes in speed pans. Keeping the top mounting surface flat so engine and tie-down holes can be drilled is difficult. This jig solves the problem. To use, simply hold the pan against the top bar with a wedge inserted between jig and pan. Make sure the jig is screwed and glued together and all parts are square. Surface the pan top before drilling. . . .

Engine Care: Keep engines clean during the winter months by removing them from the airplanes and washing them out to make sure no dirt is in them. After cleaning, coat all moving parts with a light film of oil and wrap in a clean cloth. Check models for broken joints, bad hinges, and general condition. It's a lot easier to do repair work now than to wait until next spring. Also, by waiting, repairs may be done in a hurry and some important job skipped over. The result will be an unsafe model.

## McEntee on R/C

(Continued from page 33)

Calif. (near San Francisco), the services of a large computer in Los Angeles were utilized to tabulate scores and record the order of winners for the three different events run in the two-day meet. A direct phone tie-line was used by Phil Simpson (an avid modeler and glider flier, also an engineer with Pacific Tel. & Tel.), who was in charge of data processing and handling. These facilities were available through General Electric Computer Time-Sharing Service. The computer also kept track of contestant registration and RC frequency allocations. . . .

Thermal Detection: While more fortunate glider fliers may utilize thermal sniffers to show when their craft are in rising currents, a much simpler and cheaper method has been devised. Bob Godden, who flies a simple rudder-only glider off a local hill, occasionally had been able to pick up a slope "wave," but it usually was elusive. He then resorted to "Magic Bubble" liquid from the five-and-ten. By dipping the furnished wand in the liquid and swishing it through the air, a long stream of bubbles forms and shows what really is going on in the nearby air. . . .

Current Glider Kits—the Kurwi Universal 68: Latest in the line of highly successful RC gliders, the Universal 68 can be built with many variations. With a fiberglass fuselage, the model weighs 12 ozs. and is about four and one-half feet long. Its characteristic long tail moment may be one reason the Kurwi is extremely stable and docile in flight. All wing wood is full length, including sheet, strips and hardwood spars. Standard wingspan is 115 in., but plans indicate it can be enlarged to a 139 in. As with earlier Kurwi's, wing and stab halves are held on by a



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All models have detachable wings



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All three models are fast & easy to build

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All models have 45" wing-span and are suitable for powerplants from .15-.19



Formed wire landing gear

Weight without R/C — 28 ozs.

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This fine semi-scale biplane features two of Sig's super-molded foam-wings, giving a total wing area of 580 square inches, with strip allersons. Model weighs 37 ounces less R/C equipment. See it at your local hobby shop now. \$15.95

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SHEETS STRIPS BLOCKS

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1/32x2 20c	1/16x1/8 3c	1" SQ. 6c
1/16x2 23c	1/16x3/16 4c	1" x2 13c
3/32x2 26c	1/16x1/4 4c	1" x2 16c
1/8x2 31c	1/16x1/2 5c	1" x3 23c
3/16x2 36c	1/8x1/4 5c	1" x3 26c
1/4x2 41c	3/32x1/2 5c	1" x2 23c
1/2x2 52c	1/16x3/4 7c	3" x3 36c
1/32x3 37c	1/16x1 15c	
1/16x3 40c		
3/32x3 43c		
1/8x3 46c		
3/16x3 49c		
1/4x3 52c		
1/2x3 63c		

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x4 42c	1/16x1 15c	1" SQ. 12c
1/16x4 45c	1/8x1/4 5c	1/2 x2 14c
3/32x4 48c	1/8x1/2 7c	1/2 x2 18c
1/8x4 51c	3/32x1/2 5c	1/2 x2 21c
3/16x4 54c	1/16x3/4 7c	1/2 x2 24c
1/4x4 57c	1/16x1 15c	1/2 x2 27c
1/2x4 68c		1/2 x2 30c
1/32x5 47c		1/2 x2 33c
1/16x5 50c		1/2 x2 36c
3/32x5 53c		1/2 x2 39c
1/8x5 56c		1/2 x2 42c
3/16x5 59c		1/2 x2 45c
1/4x5 62c		1/2 x2 48c
1/2x5 73c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x6 52c	1/16x1 15c	1" SQ. 12c
1/16x6 55c	1/8x1/4 5c	1/2 x2 14c
3/32x6 58c	1/8x1/2 7c	1/2 x2 18c
1/8x6 61c	3/32x1/2 5c	1/2 x2 21c
3/16x6 64c	1/16x3/4 7c	1/2 x2 24c
1/4x6 67c	1/16x1 15c	1/2 x2 27c
1/2x6 78c		1/2 x2 30c
1/32x7 57c		1/2 x2 33c
1/16x7 60c		1/2 x2 36c
3/32x7 63c		1/2 x2 39c
1/8x7 66c		1/2 x2 42c
3/16x7 69c		1/2 x2 45c
1/4x7 72c		1/2 x2 48c
1/2x7 83c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x8 62c	1/16x1 15c	1" SQ. 12c
1/16x8 65c	1/8x1/4 5c	1/2 x2 14c
3/32x8 68c	1/8x1/2 7c	1/2 x2 18c
1/8x8 71c	3/32x1/2 5c	1/2 x2 21c
3/16x8 74c	1/16x3/4 7c	1/2 x2 24c
1/4x8 77c	1/16x1 15c	1/2 x2 27c
1/2x8 88c		1/2 x2 30c
1/32x9 67c		1/2 x2 33c
1/16x9 70c		1/2 x2 36c
3/32x9 73c		1/2 x2 39c
1/8x9 76c		1/2 x2 42c
3/16x9 79c		1/2 x2 45c
1/4x9 82c		1/2 x2 48c
1/2x9 93c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x10 72c	1/16x1 15c	1" SQ. 12c
1/16x10 75c	1/8x1/4 5c	1/2 x2 14c
3/32x10 78c	1/8x1/2 7c	1/2 x2 18c
1/8x10 81c	3/32x1/2 5c	1/2 x2 21c
3/16x10 84c	1/16x3/4 7c	1/2 x2 24c
1/4x10 87c	1/16x1 15c	1/2 x2 27c
1/2x10 98c		1/2 x2 30c
1/32x11 81c		1/2 x2 33c
1/16x11 84c		1/2 x2 36c
3/32x11 87c		1/2 x2 39c
1/8x11 90c		1/2 x2 42c
3/16x11 93c		1/2 x2 45c
1/4x11 96c		1/2 x2 48c
1/2x11 107c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x12 86c	1/16x1 15c	1" SQ. 12c
1/16x12 89c	1/8x1/4 5c	1/2 x2 14c
3/32x12 92c	1/8x1/2 7c	1/2 x2 18c
1/8x12 95c	3/32x1/2 5c	1/2 x2 21c
3/16x12 98c	1/16x3/4 7c	1/2 x2 24c
1/4x12 101c	1/16x1 15c	1/2 x2 27c
1/2x12 112c		1/2 x2 30c
1/32x13 95c		1/2 x2 33c
1/16x13 98c		1/2 x2 36c
3/32x13 101c		1/2 x2 39c
1/8x13 104c		1/2 x2 42c
3/16x13 107c		1/2 x2 45c
1/4x13 110c		1/2 x2 48c
1/2x13 121c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x14 100c	1/16x1 15c	1" SQ. 12c
1/16x14 103c	1/8x1/4 5c	1/2 x2 14c
3/32x14 106c	1/8x1/2 7c	1/2 x2 18c
1/8x14 109c	3/32x1/2 5c	1/2 x2 21c
3/16x14 112c	1/16x3/4 7c	1/2 x2 24c
1/4x14 115c	1/16x1 15c	1/2 x2 27c
1/2x14 126c		1/2 x2 30c
1/32x15 103c		1/2 x2 33c
1/16x15 106c		1/2 x2 36c
3/32x15 109c		1/2 x2 39c
1/8x15 112c		1/2 x2 42c
3/16x15 115c		1/2 x2 45c
1/4x15 118c		1/2 x2 48c
1/2x15 129c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x16 108c	1/16x1 15c	1" SQ. 12c
1/16x16 111c	1/8x1/4 5c	1/2 x2 14c
3/32x16 114c	1/8x1/2 7c	1/2 x2 18c
1/8x16 117c	3/32x1/2 5c	1/2 x2 21c
3/16x16 120c	1/16x3/4 7c	1/2 x2 24c
1/4x16 123c	1/16x1 15c	1/2 x2 27c
1/2x16 134c		1/2 x2 30c
1/32x17 111c		1/2 x2 33c
1/16x17 114c		1/2 x2 36c
3/32x17 117c		1/2 x2 39c
1/8x17 120c		1/2 x2 42c
3/16x17 123c		1/2 x2 45c
1/4x17 126c		1/2 x2 48c
1/2x17 137c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x18 116c	1/16x1 15c	1" SQ. 12c
1/16x18 119c	1/8x1/4 5c	1/2 x2 14c
3/32x18 122c	1/8x1/2 7c	1/2 x2 18c
1/8x18 125c	3/32x1/2 5c	1/2 x2 21c
3/16x18 128c	1/16x3/4 7c	1/2 x2 24c
1/4x18 131c	1/16x1 15c	1/2 x2 27c
1/2x18 142c		1/2 x2 30c
1/32x19 119c		1/2 x2 33c
1/16x19 122c		1/2 x2 36c
3/32x19 125c		1/2 x2 39c
1/8x19 128c		1/2 x2 42c
3/16x19 131c		1/2 x2 45c
1/4x19 134c		1/2 x2 48c
1/2x19 145c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x20 124c	1/16x1 15c	1" SQ. 12c
1/16x20 127c	1/8x1/4 5c	1/2 x2 14c
3/32x20 130c	1/8x1/2 7c	1/2 x2 18c
1/8x20 133c	3/32x1/2 5c	1/2 x2 21c
3/16x20 136c	1/16x3/4 7c	1/2 x2 24c
1/4x20 139c	1/16x1 15c	1/2 x2 27c
1/2x20 150c		1/2 x2 30c
1/32x21 127c		1/2 x2 33c
1/16x21 130c		1/2 x2 36c
3/32x21 133c		1/2 x2 39c
1/8x21 136c		1/2 x2 42c
3/16x21 139c		1/2 x2 45c
1/4x21 142c		1/2 x2 48c
1/2x21 153c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x22 132c	1/16x1 15c	1" SQ. 12c
1/16x22 135c	1/8x1/4 5c	1/2 x2 14c
3/32x22 138c	1/8x1/2 7c	1/2 x2 18c
1/8x22 141c	3/32x1/2 5c	1/2 x2 21c
3/16x22 144c	1/16x3/4 7c	1/2 x2 24c
1/4x22 147c	1/16x1 15c	1/2 x2 27c
1/2x22 158c		1/2 x2 30c
1/32x23 135c		1/2 x2 33c
1/16x23 138c		1/2 x2 36c
3/32x23 141c		1/2 x2 39c
1/8x23 144c		1/2 x2 42c
3/16x23 147c		1/2 x2 45c
1/4x23 150c		1/2 x2 48c
1/2x23 161c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x24 140c	1/16x1 15c	1" SQ. 12c
1/16x24 143c	1/8x1/4 5c	1/2 x2 14c
3/32x24 146c	1/8x1/2 7c	1/2 x2 18c
1/8x24 149c	3/32x1/2 5c	1/2 x2 21c
3/16x24 152c	1/16x3/4 7c	1/2 x2 24c
1/4x24 155c	1/16x1 15c	1/2 x2 27c
1/2x24 166c		1/2 x2 30c
1/32x25 143c		1/2 x2 33c
1/16x25 146c		1/2 x2 36c
3/32x25 149c		1/2 x2 39c
1/8x25 152c		1/2 x2 42c
3/16x25 155c		1/2 x2 45c
1/4x25 158c		1/2 x2 48c
1/2x25 169c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x26 148c	1/16x1 15c	1" SQ. 12c
1/16x26 151c	1/8x1/4 5c	1/2 x2 14c
3/32x26 154c	1/8x1/2 7c	1/2 x2 18c
1/8x26 157c	3/32x1/2 5c	1/2 x2 21c
3/16x26 160c	1/16x3/4 7c	1/2 x2 24c
1/4x26 163c	1/16x1 15c	1/2 x2 27c
1/2x26 174c		1/2 x2 30c
1/32x27 151c		1/2 x2 33c
1/16x27 154c		1/2 x2 36c
3/32x27 157c		1/2 x2 39c
1/8x27 160c		1/2 x2 42c
3/16x27 163c		1/2 x2 45c
1/4x27 166c		1/2 x2 48c
1/2x27 177c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x28 156c	1/16x1 15c	1" SQ. 12c
1/16x28 159c	1/8x1/4 5c	1/2 x2 14c
3/32x28 162c	1/8x1/2 7c	1/2 x2 18c
1/8x28 165c	3/32x1/2 5c	1/2 x2 21c
3/16x28 168c	1/16x3/4 7c	1/2 x2 24c
1/4x28 171c	1/16x1 15c	1/2 x2 27c
1/2x28 182c		1/2 x2 30c
1/32x29 159c		1/2 x2 33c
1/16x29 162c		1/2 x2 36c
3/32x29 165c		1/2 x2 39c
1/8x29 168c		1/2 x2 42c
3/16x29 171c		1/2 x2 45c
1/4x29 174c		1/2 x2 48c
1/2x29 185c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x30 164c	1/16x1 15c	1" SQ. 12c
1/16x30 167c	1/8x1/4 5c	1/2 x2 14c
3/32x30 170c	1/8x1/2 7c	1/2 x2 18c
1/8x30 173c	3/32x1/2 5c	1/2 x2 21c
3/16x30 176c	1/16x3/4 7c	1/2 x2 24c
1/4x30 179c	1/16x1 15c	1/2 x2 27c
1/2x30 190c		1/2 x2 30c
1/32x31 167c		1/2 x2 33c
1/16x31 170c		1/2 x2 36c
3/32x31 173c		1/2 x2 39c
1/8x31 176c		1/2 x2 42c
3/16x31 179c		1/2 x2 45c
1/4x31 182c		1/2 x2 48c
1/2x31 193c		1/2 x2 51c

36" LENGTHS	1/8" LENGTHS	3" LENGTHS
1/32x32 172c	1/16x1 15c	1" SQ. 12c
1/16x32 175c	1/8x1/4 5c	1/2 x2 14c
3/32x32 178c	1/8x1/2 7c	1/2 x2 18c
1/8x32 181c	3/32x1/2 5c	1/2 x2 21c
3/16x32 184c	1/16x3/4 7c	1/2 x2 24c
1/4x32 187c	1/16x1 15c	1/2 x2 27c
1/2x32 198c		1/2 x2 30c
1/32x33 175c		1/2 x2 33c
1/16x33 178c		1/2 x2 36c
3/32x33 181c		1/2 x2 39c
1/8x33 184c		1/2 x2 42c
3/16x33 187c		1/2 x2 45c
1/4x33 190c		1/2 x2 48c
1/2x33 201c		1/2 x2 51c

1/4 x3 76c	1/4 x1 26c	24" LENGTHS
3/8 x3 89c	5/16 x1-1/4 37c	1 SQ. 44c
<b>V-H STOCK</b>	<b>TRIANGULAR CUT</b>	1 x2 84c
<b>12 LB. OR MORE</b>		2 x2 114c



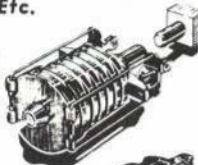
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tongue and box system.

The plans show rib shapes for Eppler 385 (good for thermal flying) and Eppler 387 (a high-speed foil for slope flying). Also shown is a flying tail and conventional stab-elevator setup. The full-size plans come with English instructions, translated by Keith Brewster. The glider will weigh around three lbs. with light equipment for R and E, and Mono Kote covering. The kit costs \$50, and definitely is not for the inexperienced builder.

## McCullough on R/C

(Continued from page 33)

engine conks out. Takeoffs and slow flight are impressive and touchdowns are easily made nose high on the main gear. Soon to fly is a ten ft. six in. Twin Porter with an even lighter wing loading.

His opinion is that only WW I or similar simple construction types with high lift sections can be built small and still deliver flights at the scale speeds now demanded by judges. The only way that modern prototypes can accomplish this is to go larger and lighter. . . .

A New Wrinkle: Check the local radio parts supply or a mail order catalog for an aerosol paint called Wrinkle Finish Spray-O-Namel. For use on wood or metal, it gives a fine-textured crackle surface for authentic reproduction of instrument panels. A can should last a whole club for several seasons. . . .

Books For Scale Modelers: Historical Aviation Album No. 8 (HAA, Box 33, Temple City, Calif. 91780. \$5.00.), the latest volume in Paul Matt's epic series, is now available. Color plates have been added but the main items of interest still are the beautiful, clear 3-views. This time they include the Waco UPF-7, Laird Super Solution and the Timm Collegiate. If you are tired of plain old

winged things, check the Vought XF5U-1 Flying Flapjack. Nastyl!

Note that all of the Matt drawings which have appeared in the HAA series, in Aero Album quarterly, and in previous issues of AAM, over 75 in all, are available in double-size 17" x 22" blueprints for 75 cents a sheet. These enlargements are a treat.

## Lowe on R/C

(Continued from page 32)

if any. If servos are moving as though under control, then keep that transmitter off, because somebody else is operating. Adjacent frequencies, if close, can jitter things but operation will not be solid.

One additional note: Occasionally a manufacturer delivers a radio set that is erroneously marked in regard to frequency; 27.045 may really be 27.095. Check out all new equipment to be sure the frequency is accurate. In our own club, Doc Rodeghero had a new rig marked 27.045 and flew it as such for awhile. Then one evening I prepared to fly on 27.095 with Doc in the air. When I flipped on the receiver, lo and behold, the servos were zipping back and forth—wow! After Doc landed we checked his rig and sure enough it was on my frequency. . . .

VTO: Ernie Huber, a guy of considerable talents, has tackled the toughest model design of all—a helicopter. Over the years, some beautiful works of art have evolved, but none were practical models that really flew. However, Ernie's ship is nearing completion, after exhaustive tether testing and overcoming such problems as blade tracking and belt slippage on the tail rotor. John Ross reports that the machine has lifted 16 lb. on a balanced test stand using a ST60. A machinist by trade, Ernie spent six months engineering the design before starting work. This machine is said to be computer-designed,

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## Planning an Operation?

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whatever that means, but the results are only as good as the accuracy of the input data. Let's hope that Ernie put in the right data and used the right equations! . . .

RC First Aid: OK, so we got shot down, had a glitch, or made an inverted pass and pulled up instead of down and there it lies in a heap—all that work down the drain! Naturally, the first concern is for those expensive innards called the control system. What can be done to determine its status, be it dead, alive or somewhere in between? Jim McNerney, in the DC R/C Newsletter, makes some suggestions.

Don't: (1) Frantically wiggle the sticks to see if it's been killed. (2) Dust it off, fire it up, and go again. (3) Pick up the system by one component, leaving the rest to dangle. (4) Plug a suspect component into a buddy's system.

Do: (1) Turn it off (if you can find the switch). (2) Unplug the battery and check for shorts (heat). (3) Check servos and receiver plugs for bent pins, cuts or breaks in wires, etc. (4) Check servos for damaged gears, cases, etc.

If the system seems OK, hook it up and operate, but don't fly it. Take the system home where it can be opened up and every component, such as antenna and wires, servo electronics, checked for integrity. Wiggle components, check for broken ones. If it doesn't work at all and no physical damage is evident, the receiver crystal may be broken. Check by wrapping the receiver antenna around transmitter antenna. It should work if a crystal is the problem. If a servo runs to one end, the problem could be a bad output transistor.

If you don't understand the beast, don't tinker with it! Wrap it up and send the complete rig back to the manufacturer. Include a description of what preceded the crash, if equipment failure is suspected.

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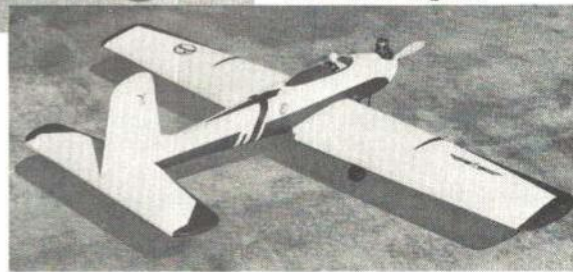
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No. 0192, **Ryan Mailplane** — Light, F/F, with plenty of details. For rubber indoor or outdoor. Plan has scale views. \$1.50

No. 0193, **Mig 21d** — 40-powered C/L version of Russian fighter is fast, stable flyer. By Roland Baltes. \$2.50

No. 0194, **1937 Gas Model** — Half-size 049 copy of great old-timer. Has durability and easy-to-fly characteristics. Frank Ehling. \$2

No. 0091, **Halberstadt** — Nearly scale R/C WW I fighter with semi-symmetrical 6' wings. 60-powered. Two sheets. \$4

No. 0791, **Pusher Galore** — Bill Hannan's all-sheet, rubber pusher for Tenderfoot. Looks like supersonic transport. \$75

No. 0894, **Voltswagen** — Trainer and stunter by Marsh for electric tether flying with slot-car motors. Plans for the pylon included. Great club activity. \$1.50

No. 0794, **Skimmer Airboat** — Sled-type fun watercraft by Paul Hook. .09 engine, R/C rudder, throttle. \$2

No. 0991, **Flashby I** — Rakish-looking all-balsa ROG by Wayne Brown. For the Tenderfoot. Tricycle gear. \$1

No. 0892, **Fouga Cyclone** — Scale model of jet-assisted French sailplane, by Nick Zirolli. Gains altitude easily on 09 engine. A two-piece 7-ft. wing. For R/C. \$3.50

No. 0993, **La Jollita** — Profile 15-powered Goodyear C/L racer by James Kloth. Fast, groovy. On mild fuel and engine does 85 mph. \$1.25

No. 0892, **Taylor Cub F-2** — Sport, F/F, scale, .020. Stick-and-tissue. By Schreyer. \$1.75

No. 0893, **Martin MO-1** — Rare WW-1 era monoplane, carrier fighter ideal for Class 1 Carrier. Ailerons keep lines tight at low speed. By Reeves. \$1.50

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### Spinks Akromaster

(Continued from page 26)

fuselage wing saddle (see drawing). Then drill the ¼" dowel holes in the rear fuselage ply saddle before it is glued on. The front saddle can wait until the wing and its saddle are finished. Then drill the two holes through them both. For added strength, some small pieces of ¾" maple triangle stock are put behind the firewall and onto the sides.

Next, lay out and drill holes for the Nyrods. The ½" sheet top then can be installed. Cut the top at F4 and cement on the rear portion. Glue in large nose blocks. Then plane and sand sides of the fuselage for the 45-degree angle top sheets. The top must be rounded to the contour shown on drawing. This template is cut in half, which makes it easier to use. Install Nyrods and sheet the bottom with ¼" balsa.

The 1" nose block is held on with two wood screws. Two 5/16" holes are drilled right through the block into fuselage. The holes are filled with pieces of 5/16" dowel glued into the block and fuselage. Then drill through them for the wood screws. The result is a more permanent hardwood mounting.

The nose is shaped to the outline shown in the Spinks article and on the plans. It's a rather simple one. Cut out the back of the nose block to fit engine carburetor and throttle linkage. With the engine mounted, check the clearance for prop and spinner.

Behind the forward ¼" ply wing saddle on the fuselage, epoxy a piece of hardwood triangle stock. This will ac-



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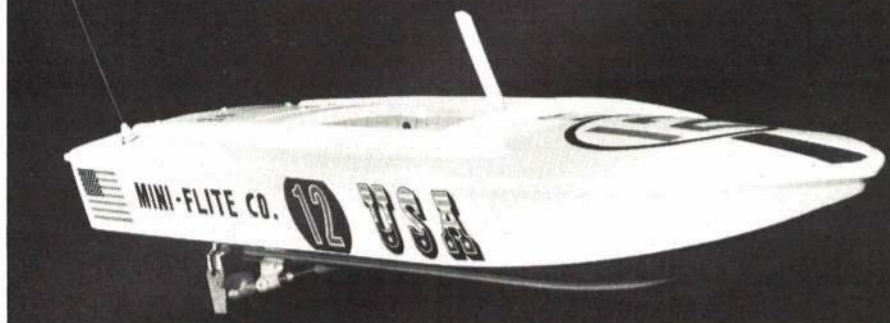


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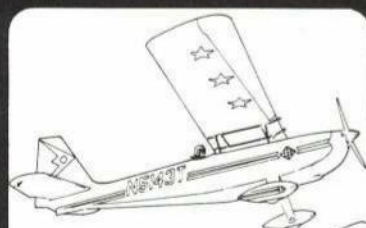
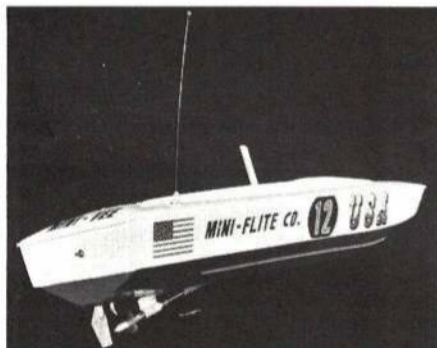
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cept the 10-32 tapped holes to hold the forward part of the wing to the fuselage.

The stabilizer and elevator are ½" sheet, and the fin and rudder are ¾" sheet balsa. Hinge as desired. The stab, fitted between two balsa filler blocks, must be set at zero degrees incidence.

A fellow flier helped me cut the foam wing. A piece of trailing edge balsa stock is glued to the trailing edge of the core. The leading edge is a piece of ½" sheet rounded off to match the airfoil. The core is then sheeted with 1/16" balsa. Lay out and cut the ailerons. The sheet on front of the aileron is replaced after the angle is cut.

Then mark out the round aileron bellcrank wells, which can be cut out with 1/32" music wire in a soldering gun. Remove an oversize disk of balsa, insert the hot wire and rotate. The wire cuts a perfect wafer of foam. Then a bellcrank is mounted on a 3/32" ply disk and epoxied in place. Now take a ¼" piece of music wire, heat the end with a propane torch, and plunge it down through the wing. This makes the pushrod slot. Assemble bellcrank and wire. Do this to both halves and then epoxy together, using glass cloth around the joints.

Both front and back sides of the saddle are ½" ply. Glue the landing gear blocks together. Hollow out the wing to receive the double-decker gear mount and attach it with plenty of epoxy. Cover this assembled saddle with 1/16" ply. Note that the landing gears are mounted across the saddle, one in front of the other. When covering the 3/16" wire gear, make the groove for one forward of center and the other to the rear. When viewed from the side no one will know one landing gear is ahead of the other, and the ground handling is not affected at all.

Two ¼" dia. dowels hold on the rear wing, and two 10-32 nylon bolts retain the front. I lay the wing on a flat piece of 4' sq. Novoply, which is flat and true and makes an excellent work surface. Glue on stab and rudder. I buried a Royal Products tail-wheel bracket in the rear of the fuselage, although any combination of 3/32" wire and tubing should work. The rudder has a hole drilled in it to accept the movable arm of the tail wheel.

Radio installation is up to the builder. I used a Kraft with KP-10 servos. Try to keep the weight down.

The entire plane was covered with Super MonoKote, which keeps the weight within reason. For an exact copy of the real plane, follow closely the color scheme given in the AAM article. June '69 Air Progress has a color photo of the Spinks and it's a beauty.

The canopy was vacuum-formed and cemented in place with Walthers Goo. The wheel pants were molded in fiberglass after R.T.V. molds were produced from wooden patterns. A Royal Products needle-nose spinner was used on the front end. Plywood fairings, added to the landing gear, have slots which are staggered to give the appearance of both axles being on a common centerline.

It would be nice to say that Spinks flew the first time out, but it didn't! A loose transmitter antenna caused some range problems. Once the antenna was securely tightened, the plane flew like a dream. It tracks straight and true on level ground and then rises off smoothly at about half-throttle. Push the throttle full forward and the Spinks moves up like a scorched cat. It does fly fast but



is extremely groovy.

As might be expected, the plane flies inverted with a minimum of down elevator, and the rolls are smooth. The knife edge also is excellent. It would seem that the big, wide fuselage might detract from both knife edge or straight and level, but it doesn't seem to affect them and even may help. The small stab and elevator are more than adequate. I used a long Rocket City horn on the elevator. The plane enters a spin realistically but must be completely stalled out. Try a Lomcovak and watch it flip like a spinning pinwheel.

The Spinks lands like it flies—fast. Go way out and start chopping the throttle on the downwind leg. Then turn and kill it all the way. As the plane settles, keep hauling back on the elevator. Touchdown will occur when the glide can't be stretched any more. Any wind will help slow it considerably. Flaps might help, but none are shown in the AAM drawing or mentioned in the article. A 60 engine is more than adequate, and a 40 or 45 would handle it well. For scale enthusiasts the Spinks Akromaster is an easy one to build.

Should anyone want a canopy, wheel pants or a foam wing I will make them available if the demand warrants it.

## Autogiro

(Continued from page 17)

and bend three rotor arms from 1/16" dia. wire. The rotor hub is made from 1/32" sheet brass or galvanized iron, with a 3/32" dia. hole drilled in its center. A rotor hub bushing is cut from brass tubing (1/16" ID and 3/32" OD). Jig up this assembly in an inverted position, by inserting the brass tubing into the hub and spacing the rotor arms 120 degrees apart. Recheck the assembly's alignment and then solder into one unit. After soldering, turn the completed unit over into the proper position and twist each arm end up five degrees.

**Rotor Blades:** Cut three rotor blades from 3/32" sheet balsa and sand all their edges round. Then cement a 1/16 x 1/8" balsa frame to the bottom of each rotor blade. Insert a rotor arm (from the soldered assembly) into the frame of each rotor blade. Glue this area thoroughly. When this unit has dried, bend each arm to form a 2 1/4" dihedral at the tip of each rotor blade.

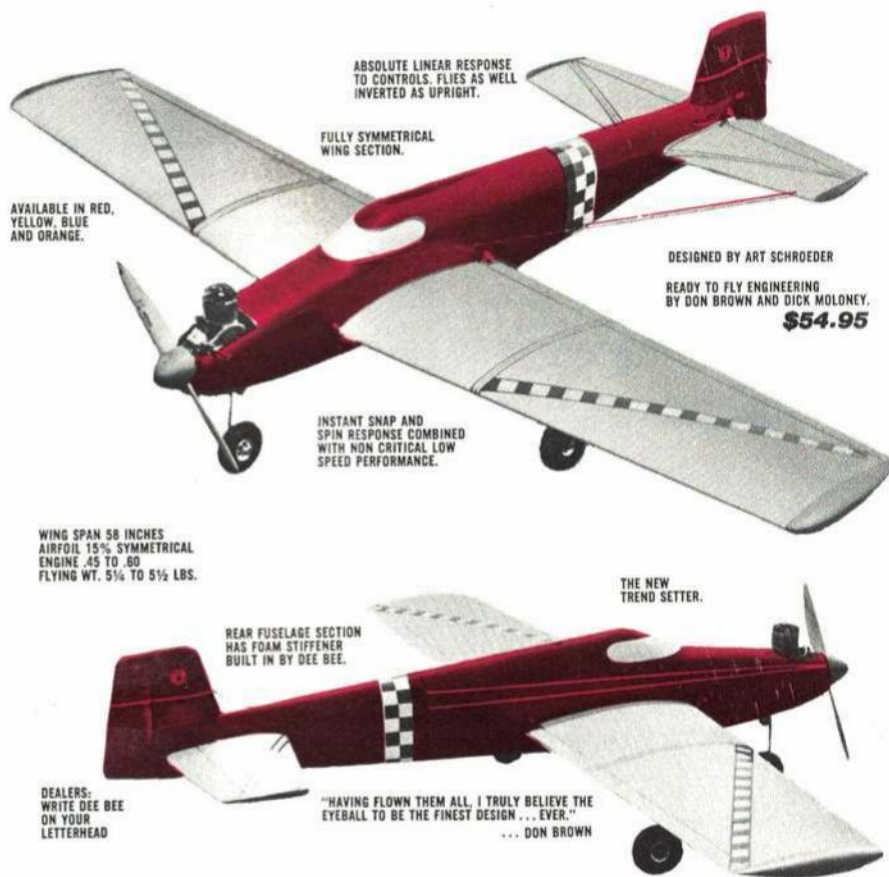
**Landing Gear:** Cut 1/16" dia. wire to length and bend to shape. Next, notch the previously installed landing gear platforms 1/16" deep and insert wire flush with the platform's surface. Fasten the landing gear to the fuselage with 1/32" aluminum landing gear retainers, which are wood-screwed to the plywood platform. With soft wire, bind each side of the main landing gear V and solder. Also solder the inside wheel-retaining washers and install wheels, then solder the outside wheel-retaining washers.

**Final Assembly:** This autogiro was designed for 049 engine power. Select one of the medium-power engines and mount it to the 1/8" plywood firewall with wood screws. Keep the thrust line as near to zero degrees as possible. A 6 x 4" nylon pusher prop is used but each blade tip is trimmed 3/4" to make the diameter 4 1/2".

To install the fuel tank, hollow out the balsa just below the firewall. The size of tank needed depends on the flying field's area. Although the autogiro can climb to tremendous heights, it descends nearby in still air.

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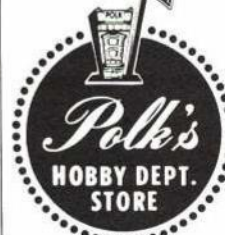
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Begin installation of the completed  
rotor assembly by placing a plain washer  
over the 1/16" dia. rotor shaft, then  
add the rotor assembly. On top of that,  
sandwich a ball-bearing between two  
plain washers. Bind the tip of the shaft  
with fine wire and solder. The rotor  
blades should spin freely and be reason-  
ably well-balanced. Balance the blades by  
inserting and gluing small bits of lead  
to the lighter blade tips.

Insert 1/8" hardwood dowels to the  
rear of the fuselage, and rubber-band  
the tail unit in place. Check alignment.  
The center of gravity position is shown  
on the plans and can be corrected by  
adding lead weight to the nose or tail.

My model was finished with one coat  
of black fuelproof dope and striped with  
yellow markings. Dummy cabin windows  
were striped with tape and doped a pale  
green.

Testing and Flying: After rechecking  
the alignment of flying surfaces and the  
center of gravity location, one important  
adjustment remains before test flying.  
Tilt the entire rotor assembly to the  
left (as viewed from the rear of model)  
by bending the rotor shaft, just below  
the rotor bushing, approximately 1/32"  
to 1/16" from the vertical. This slight  
bend in the rotor shaft is an effective  
control in flight. When the rotor shaft  
is bent to left, the results are similar  
to rudder control. Bending the shaft  
back has the same effect as incidence  
to a fixed-wing model.

Select a grassy area for testing. Lean  
out the needle valve to full power. To  
start the rotor blades rotating in the  
proper direction (counter-clockwise),  
turn them with a finger. An autogiro is  
never launched by throwing. Instead,  
with model facing the wind, walk until  
the rotor blades develop enough lift to  
fly the model out of the hand. Observe  
the first flight carefully.

If the model turns sharply to the left

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bend the rotor shaft slightly from left  
to right or to a more vertical position.  
With ideal adjustments the model should  
fly in left-hand circles about 300 ft. in  
diameter, climbing slowly to 400 to  
500 ft.

After the engine stops, the autogiro  
should descend slowly, with near zero  
forward speed. If a series of gentle stalls  
occurs upon descent, move the center of  
gravity forward by adding weight to the  
model's nose. Flight adjustments are not  
difficult to achieve. Keep in mind the  
following: (1) Power-bend the rotor shaft  
for proper climb and turns, using rudder  
tab for fine adjustments; (2) Descent-  
shift center of gravity position until the  
model descends nearly vertically.

## Tips for Performance

(Continued from page 15)

faces is provided. The best rule here is:  
only one adjustment at a time. Then  
if an error has been made, it's much  
simpler to undo it!

After trying various types of power,  
begin experimenting with the props. In  
order to obtain smoother and more ef-  
ficient performance, it is worthwhile to  
balance the props. As when changing  
rubber, switching props probably will  
bring about a change in the model's  
balance. You may wonder why smaller  
props are suggested, since virtually every  
article emphasizes the merits of large  
props. However, blanket recommenda-  
tions of that kind must be tempered  
with moderation. Probably more rubber-  
powered scale models have self-destructed  
from being overpropped and/or over-  
powered than from any other single  
cause, with the possible exception of  
warps. Models, which may be marginally  
unstable, will often perform happily  
with a small prop, whereas a larger fan  
may render them completely unflyable.  
But try it and see.

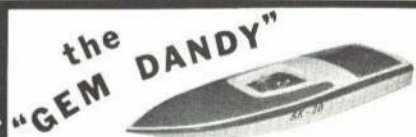
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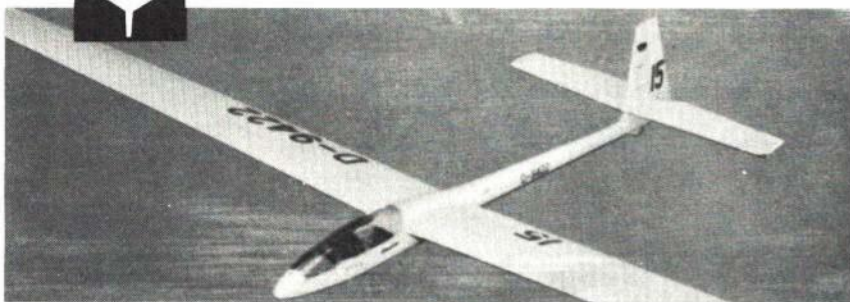
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a model's entire flight pattern. Watch, in particular, its effect on turning radius, especially when the model is set up to fly in right-hand circles. Since a change in props often brings about a change in speed, be prepared for the effect of slight warps or maladjustments to be magnified.

### Tardon

(Continued from page 31)

adding 1/16" plywood formers fore and aft.

Cut out the cockpit and finish the area under the canopy. After a pilot and instrument panel are installed, epoxy the canopy in place.

Finishing and Painting: The choice of finishing methods is varied. We began with a good sanding; two coats of Hobby-poxy clear; two coats of automotive primer, wet-sanded between coats; and

the final finish of two coats of dope or acrylic lacquer. Rub and wax as desired.

Equipment Installation: When the finish has dried, hinge the control surfaces, making sure they all move freely. Add the landing gear and tail-wheel. Install a K&B 40 rear rotor with a 2 1/4" spinner.

Because of the long tail-moment, radio equipment must be placed as far forward as possible. Even so, it may be necessary to add lead to the nose. Tardon II weighed in at 4 lb. 12 oz. before balancing. After balancing, it checked out at 5 lb. 4 oz. It is more important that the plane balance at the CG than weigh in at 5 lb.

Control movement is quite important, since most RCers use too much. By following the recommended throws on the plan, no difficulties should arise. Remember that at higher speeds less throw is just as effective as a large throw at slow speeds.

### Orbit Cobra

(Continued from page 39)

on a shelf. Below it, on one side, is an Eveready battery (#276) whose current consumption was measured at 60 ma. Although not rechargeable, this battery should last for two to three months of hard use. (A NiCad battery with charger is available at a slight extra cost.) Voltage between the antenna and battery terminal was measured at .8V. Signal amplitude on a CRT showed .67V from base line to peak. The battery is changed merely by removing the back cover (held by two screws) and slipping in a new one.

Throttle and gearshift levers are located on a separate board on the right side in a straightforward manner.

The receiver is the same size as all the others in Orbit's 1970 line, but it does have one significant innovation. All connectors are now much smaller so that the car-borne system can be installed easily, with minimum bulk.

The switch is the old reliable sliding type supplied with regular Orbit sets. The battery is square, which made it easier to install than the flat pack. The battery capacity is 500 ma. The receiver batteries, which are NiCads, can be charged as usual with the charger module supplied in the set. The power plugs are a new triangular polarized configuration.

Servos are based on the new 1970 PS-3D Mark III configuration. While the radio will operate the 1969 PS-3 type servos, older radio systems will not operate these new servos because of the pulse frame rate and configuration. The servos delivered four lb. thrust on the linear output but, when a rotary output is used, more speed (albeit with less thrust) is available. Speed, rather than force, is essential, especially for a car's throttle. We found the servo transit time of 0.6 sec. fairly adequate. Resolution was excellent and there was no hint of cross talk or mutual interference.

During a typical car race, the transmitter may be put on the ground (blacktop) and track temperature at times may reach 125 degrees. With mixed feelings we left the transmitter

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on the track for 45 min. under the boiling California sun. The car also was left standing with the body unpainted, and yet no hint of drift or glitches developed. Thinking of our Northern buddies (who may want to operate radio-controlled snowmobiles on ice), we wanted to test the radio in a cold chamber but, lacking that, a two-hour immersion in the family refrigerator had to do. Although the servos became a little sluggish, at least they did not act crazy.

Orbit also offers a thick-gear PS-5 car servo. Its gears are strip-proof and operation is very fast. We did not have these during technical testing.

## The Dynamic Car

After testing and examination of the radio, the Editor installed an identical Orbit set with the PS-5 thick-gear fast-action servos in the Dynamic car. The following description of the car is based on several weeks of operation, adjustments, and racing at the RC model car Nationals.

Instructions included with the car describe and illustrate only its basic assembly. Because of the four-wheel independent suspension, torque converter transmission, and four-part frame, the car has numerous parts and requires plenty of screwdriver exercise. Wrenches for Allen head bolts in the kit are supplied. No special tools are needed, but a Dremel Moto-tool is helpful for trimming excess material beside the spring suspension cups on the stanchions. Detailed instructions for radio installation, suspension adjustment, and handling setup are not provided. These elements are so in-

dividualized as to driver, radio brand, and driving surface that instructions would be useless.

Our installation is unique. Orbit's three-servo side-by-side tray was mounted on hardwood supports and located just behind the front suspension stanchions. The steering servo has rotary output and is centrally located. The servo on the right (viewed looking forward) is transmission/clutch function and the servo on the left is the throttle function. The steering control arms were lengthened. A separate link from the servo disk goes to each front-wheel steering arm. The receiver is wrapped in foam and placed between the front suspension stanchions. The battery pack and on-off switch are positioned beside the motor.

Once the car was assembled, it was operated to break in all parts properly, especially the transmission. Then it was completely disassembled, each part cleaned, and reassembled using Lock-Tite on all screws. The suspension elements at the bottom stanchion mounts were not permanently tightened. These are to be adjusted for handling. The universal joint which screws into the transmission was tightened, then drilled for a thin cotter pin. The transmission case was assembled with gasket glue (silicone rubber works well here too) and sealed to retain as much oil as possible. The procedures of break-in, reassembly, and use of Lock-Tite have made this Dynamic car extremely reliable.

Suspension adjustments are as follows: front wheels toe-in three degrees, tires flat on the road with control arms perfectly parallel, a 1/16" thick washer is then inserted under

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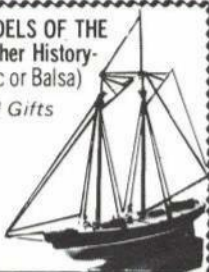
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the rear stanchion mount. This tilts the entire front end forward to give a castering effect and to provide under-steer during hard cornering. It should be adjusted for different racing surfaces—the more slippery the surface, the more tilt. If oversteer (continuous spin-outs) remains a problem, put a strip of plastic electrical tape around the front tire, covering with one layer of tape only the second and third treads in from the outside. This reduces tire bite.

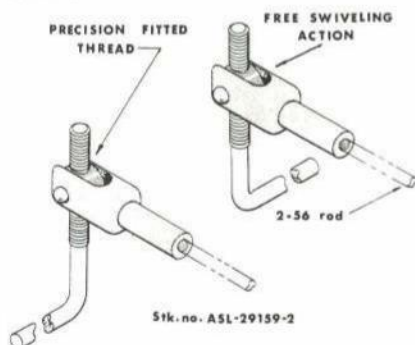
At the rear, the suspension must be set to have the tires flat on the road at all suspension positions. This means equal length control arms. Adjust the rear suspension spring to be quite hard and stiff. The downward travel of the rear suspension must be limited by drilling and tapping a 4-40

bolt hole immediately under the lower control arms on the chassis and just beside the stanchions. A 4-40 round-head screw in these holes is screwed in from the top, which stops the suspension so that the universal joints are parallel to the road. Not only does this improve handling, but it also eliminates universal joint wear.

Many builders of the Dynamic car have complained that it is not strong enough to withstand the abuse of hard racing and hitting walls or sharp rocks. At the car Nationals, I learned from Dynamic that a front nerf bar could be added to protect the front suspension. All the open-wheeled cars used such protection. I also learned that a strong music-wire connection must be used between servo and steering arms or between steering arms, depending

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Vern is shown with two of his built-up kits. On the left is his new VK Fokker Tri Plane and also shown is the popular VK Nieuport. Both of these models were assembled using Ambroid Liquid Cement, the best cement money can buy. Try a tube on your next model or repair job, then you too will say "Ambroid's My Brand".

on the setup. My car has hit all kinds of obstacles, bounced over rocks, and often hit the wall. However, after adding the nerf bar and stiff steering links, the car is just as rugged as the non-suspended type cars.

The question most asked at the Nationals was whether it is worth the trouble to have a suspension such as this one. Some cars had absolutely no suspension. Driver limitations (my errors and inexperience) kept the car from contention, but it handled better, it always passed the competition during the corners, and, with the torque converter solidly in gear, it usually outraced them on the straight. I think the suspension is worth the trouble and expense, but it must be patiently adjusted, trimmed, tested, etc., to obtain top-notch performance. If these results are not worth the time involved, use a simpler car—but don't expect the same ultimate performance, available only with the Dynamic car.

Together, the Orbit Cobra and the fully suspended Dynamic car make a winning combination.

### AIR SHOW

The Confederate Air Force *Flying Museum* Air Show will be held at Rebel Field in Harlingen, Texas, on October 25th, 1970.

For additional information on the show, featuring World War II combat aircraft in action, contact: Headquarters, Rebel Field, Harlingen, Tex. 78550.

### AMA Contest Calendar

(Continued from page 56)

Oct. 4—Milford, Conn. (A) Flying Aces Club Fall Meet for rubber powered events. Site: Pinkham Field-Orange Ave. D. Stott CD, 66 Bankside St., Bridgeport, Conn. 06606. Sponsor: Flying Aces Club.

Oct. 4—Council Bluffs, Iowa (AA) Annual Good-year & Rat Race CL Contest. Site: Iowa School for the Deaf, H. Hough CD, 924 Avenue I, Council Bluffs, Iowa 51501. Sponsor: Balsa Busters.

Oct. 4—LaSalle, Ill. (AA) Illinois Valley RC Annual Contest. Site: Hamer Strip, M. Doucey CD, 600 Arch St., Ottawa, Ill. 61350. Sponsor: Illinois Valley Radio Control Club.

Oct. 4—Van Nuys, Calif. (AA) Flightmasters Annual FF, CL & RC Meet. Site: Sepulveda Basin, J. Bailey CD, 11161 Mansel Ave., Inglewood, Calif. 90304. Sponsor: Flightmasters.

Oct. 10-11—Taft, Calif. (AA) Califas Annual FF Meet. Site: Gardner Field, A. Vela CD, 11807 Crystal, Chino, Calif. 91710. Sponsor: Califas Club.

Oct. 10-11—New Orleans, La. (AA) 9th Annual Crescent City RC Contest. Site: Crescent City RC Club Field, A. Wiltz CD, 3231 47th St., Metairie, La. 70001.

Oct. 11—Ohio City, Ohio (A) RC Club Contest. Site: Club Field, D. Kraner CD, RR #1, Ohio City, Ohio 43874. Sponsor: SHOO Flyers MAC, Inc.

Oct. 11—Mentor, Ohio, MARCS 14 Midget RC Pylon Race. Site: Club Field, F. Vidmar CD, 26500 Zeman Ave., Euclid, Ohio 44132.

Oct. 11—Watermill, L.I., N.Y. (AA) Suffolk Falcon's 4th Annual Hydro Meet. Site: Mill Pond, D. McGovern CD, P.O. Drawer E, 140 Wagon Lane W., Centereach, L.I., N.Y. 11720. Sponsor: Suffolk Falcon's Club.

Oct. 11—Sacramento, Calif. (AA) Northern Calif. FF Council Contest. Site: Condors Field (Weagel Field), R. Fallon CD, 2667 61st St., Sacramento, Calif. 95817. Sponsor: Capitol Condors.

Oct. 11—Lincoln Park, N.J. (AA) 12th Annual CL Model Air Show. Site: GSCB Club Field, A. Cangialosi CD, 131 Horseneck Rd., Fairfield, N.J. 07006. Sponsor: Garden State Circle Burners.

Oct. 11—Vineland, N.J. (AA) Charles Riser Memorial CL Meet. Site: Senior High School, K. Andrews CD, RD 3, Box 260, Millville, N.J. 08332. Sponsor: South Jersey Aeromodelers.

Oct. 11—Phoenix, Ariz. (AA) 4th Annual Phoenix RC Invitational Meet. Site: To be announced, N. Lemak CD, 2810 W. Golden Ln., Phoenix, Ariz. 85021. Sponsor: Air-Zona Model Airplane Club.

Oct. 11—Richmond, Va. (AA) Brainbusters Annual Fall FF Meet. Site: Curles Neck Farm, R. Lynch CD, 742 Tombark Dr., Newport News, Va. 23609. Sponsor:

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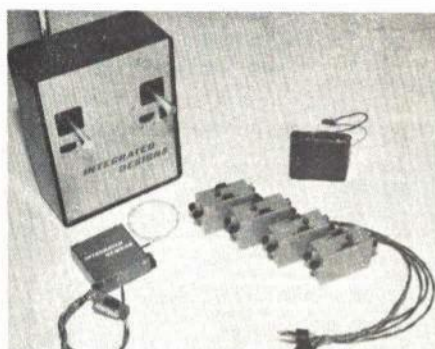
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9-3 9-4 50¢	9-3 9-4 50¢	9-3 9-4 50¢	9-3 9-4 50¢
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11-3 11-4 50¢	11-3 11-4 50¢	11-3 11-4 50¢	11-3 11-4 50¢
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Oct. 17-18—Oklahoma City, Okla. Oklahoma Model Hobbie Fair Demo. Flying. Site: State Fair Park. R. McGee CD, 405 NW 30th, Oklahoma City, Okla. 73118. Sponsor: T.O.R.K.S.

Oct. 18—Garden Grove, Calif. (AAA) Golden West CL Championships. Site: Garden Grove Park. J. Plaunt CD, 106 S. Monterey St., #3, Alhambra, Calif. 91801. Sponsor: Orange County Thunderbugs Model Airplane Club.

Oct. 24-25—Bay St. Louis, Miss. (AA) 5th Annual Dyna-Soarers FF Folly. Site: Bayside Park. J. Pedreira CD, 4658 Redwood St., New Orleans, La. 70127. Sponsor: Dyna-Soarers MAC.

Oct. 24-25—So. El Monte, Calif. (AA) Open Pylon RC Races. Site: Whittier Narrows. J. Garabedian CD, 909 N. 3rd St., Montebello, Calif. 90640. Sponsor: San Gabriel Valley RC.

Oct. 25—Fresno, Calif. (A) Fresno's Monthly FF Contest. Site: Near Kerman, Calif. F. Gallo CD, 1725 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: Fresno Gas Model Club.

Nov. 7-8—Taft, Calif. (AA) WFFA FAI Annual FF Contest. Site: Gardner Field. B. Vinson CD, 233 E. Wilson, Costa Mesa, Calif. 92627. Sponsor: Sky Hoppers of Orange County.

Nov. 15—Colorado (A) Magnificent Mountain Men Indoor Meet. Site: Hinkley High School. H. Blubaugh CD, 555 Moline St., Aurora, Colo. 80010. Sponsor: Magnificent Mountain Men.

Nov. 15—Sacramento, Calif. (AA) Northern Calif. FF Council Contest. Site: Condors Field (Weasel Field). D. Foote CD, 2438 Palmetto St., Oakland, Calif. 94602. Sponsor: Oakland Cloud Dusters.

Nov. 22—Van Nuys, Calif. (Special Contest) Northrop Flying Wing Contest. Site: Model Airport (Basin). C. Hatrak CD, 3825 W. 144th St., Hawthorne, Calif. 90205.

Nov. 27-28-29—Tucson, Ariz. (AA) Winter RC Nationals. Site: Marana Air Park. R. Angus CD, 6640 N. Columbus, Tucson, Ariz. 85718. Sponsor: Tucson RC Club.

Nov. 29—Fresno, Calif. (A) Fresno's Monthly FF Contest. Site: Near Kerman, Calif. F. Gallo CD, 1725 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: Fresno Gas Model Club.

Dec. 13—Van Nuys, Calif. 2nd Annual Jumbo Rubber Scale FF Meet. Site: Sepulveda Basin. J. Bailey CD, 11161 Mansel Ave., Inglewood, Calif. 90304. Sponsor: Flightmasters.

Dec. 13—Los Angeles, Calif. (AA) SCIFS Year Ender for Old Timer Events. Site: Sepulveda Basin. J. Keller CD, 1890 Moore St., Simi, Calif. 93065. Sponsor: Southern California Ignition Flyers.

Dec. 27—Fresno, Calif. (A) Fresno's Monthly FF Contest. Site: Near Kerman, Calif. F. Gallo CD, 1725 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: Fresno Gas Model Club.

Dec. 27-28—Winter Park, Fla. (AA) Tangerine International RC Championships. Site: RCACF Field. W. Schoonard CD, 2080 Sharon Dr., Winter Park, Fla. 32789.

## 1970 Nats

(Continued from page 56)

this year but became Champ by taking fourth in Pylon I, and fifth in D Pattern.

The 1969 U.S. RC World Championship team took the top four D Pattern places, including second place for Jim Edwards (New Albany, Miss.) who was the reserve team member last year. Jim Kirkland (Valparaiso, Fla.) took first, Phil Kraft (Oceanside, Calif.) was third, Jim Whitley (Decatur, Ala.) was fourth.

The third annual Delta Dart Nats event was again a great success. More models were actually flown than ever before—over two thousand out of many more that were built. Over forty people pitched in to operate the event which ran during five days of the Nats, including one special day for children of station personnel.

This year the event featured the HIAA-Flyer version of the Delta Dart, with bulk-pack kits produced by member firms of the Hobby Industry Assn. of America. New simplified pictorial instructions were used to aid construction, and the kits were praised as a major contribution to the current AMA-HIAA Junior Program.

The event was highlighted on local TV, with a reporter building a Dart for the cameras. Miss Model Aviation—Suzanne Bowie, a cute and cheerful Continental Airlines stewardess—also built and flew a Delta Dart along with the youngsters. One hundred and fifty awards were given to Delta Dart con-



testants—30 per day; 10 for each of three age groups from 8 to 13. Delta Dart was a big effort this year, better supported and organized than ever before.

Scale got a major overhaul in practically all categories this year, with new procedures and scoring forms. As a result, Scale judging was credited with being more consistent and efficient this year, despite increased entries. Control Line had some crowd control and score confusion problems, but otherwise Scale as a whole was a happier Nats category to most entrants. To top off a great week, the AMA Executive Council approved the upgrading of Scale to full Contest Board status, effective immediately, with Claude McCullough (Ottumwa, Iowa) as its first chairman.

Nats week was climaxed by an outstanding Sunday Air Show. The Navy's Air Barons—also dubbed the Red Barons due to their colorful uniforms—put on a great full scale precision flying demonstration which equalled that of the better known Blue Angels Navy team. The Barons' A4D Skyhawks were smaller and more maneuverable, enabling their show to be flown in a much smaller area of airspace.

Both before and after the Barons, modelers flew all types of demonstrations: CL Combat and Racing, Speed and Stunt; RC Sailplaning, Pylon Racing, Aerobatics; FF was represented by a great Old Timer flight and a pair of flying saucers. At one time there were at least twelve models in the air simultaneously. About seventy-five modelers took part, and each received a special Nats Air Show medal and ribbon from Miss Model Aviation at the end of the program.

Nats week ended suddenly and spectacularly at the close of the Air Show. As the show ended, Admiral Bernard M. Streen, Chief of Naval Air Training, Pensacola, Fla., indicated his pleasure at how well the Nats went and said that the 1971 Nats would be held again at Glenview. This was further confirmed by the new commanding officer for Glenview who took over immediately after this year's Nats. The basic Navy position seems to be that economic and operational problems prevent continuing the former policy of changing the Nats location each year, at least for the present. The next best thing, according to Navy officers, is to do all that's possible to make the Nats at Glenview better than ever so as to make the trip worthwhile for those who might be able to come from far away.

Already discussions are being held to improve on various aspects of the 1970 Nats, with a particular view toward better informing of contestants and spectators as to field activity and also simplification of paperwork, procedures, and processing.

One new aspect of the 1970 Nats was well received—tenting. The tent and camping trailer areas were well used and caused no major problems. They greatly relieved the berthing shortage at Glenview and permitted many to attend the Nats cheaply so as to offset the cost of traveling. The success of this operation has assured its continuance next year.

In a future issue we'll tell more about the great '70 Nats: how it was organized and who contributed to its success. It's a story worth knowing—it took well over a hundred officials and lots of effort.

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